Berichte
aus dem
Institut für Meereskunde
an der
Christian-Albrechts-Universität Kiel
Nr. 89/B
1981

THE GATE LAGRANGIAN BATFISH EXPERIMENT
DATA REPORT, PART 12
MAP 3L3

by
John Woods, Harry Leach, Peter Minnett

DOI 10.3289/IFM_BER_89,B

Copies of this Report are available from
Prof. J. D. Woods
Institut für Meereskunde
Düsternbrooker Weg 20
D-2300 Kiel 1
Federal Republic of Germany

ISSN 0341 - 8561

CONTENTS

PART 12 MAP 3L3

SUMMARY

This data report presents selected standard products derived by computer processing of a data set obtained during the third survey of the third Lagrangian time series in the batfish experiment carried out on board RRS "Discovery" during GATE (the Atlantic Tropical Experiment of the Global Atmospheric Research Programme) in 1974. The data report is part 12 of a thirteen-part set; each part contains the data products from one survey in the batfish experiment. The raw data set for the survey 3L3 presented here comprised a time series of over 2.5 million samples of temperature, conductivity and pressure from a Neil Brown CTD mounted in a batfish that undulated between 0 and 70 metres depth as it was towed at 8 to 10 knots around a survey pattern comprising 13 parallel legs each 12 miles long and spaced 1 mile apart. The batfish undulations gave over 1000 profiles through the upper Tropical thermocline including the salinity maximum. The products presented in this report reveal the variation of temperature, salinity and density structure on horizontal scales of 1 to 25 km. Extensive use has been made of interpolation onto isopycnals, which has helped to reveal the separate contributions of (1) internal waves and (2) quasi-gestrophic turbulence. The products include (1) profiles, (2) sections, (3) maps and (4) statistics.

ZUSAMMENFASSUNG

In dem vorliegenden Datenbericht werden Ergebnisse, des während GATE (1974) an Bord des RRS "Discovery" durchgeführten Batfish-Experiments, präsentiert. Die hier gezeigten Darstellungen wurden aus einem Datensatz hergeleitet, der im dritten Teilabschnitt der dritten Lagrang'schen Zeitreihe zusammengestellt wurde. Der vorliegende Bericht ist der zwölfte Band einer dreizehnteiligen Serie. Jeder Band enthält Resultate eines Teilabschnitts des Batfish-Experiments. Der Rohdatensatz für den hier dargestellten Teilabschnitt (Map 3L3) besteht aus einer Zeitreihe, die sich aus über 2,5 Millionen Meßwerten von Temperatur, Leitfähigkeit und Druck zusammensetzt. Eine im Batfish montierte Neil Brown CTD-Sonde lieferte diese Daten. Der Batfish folgte einer Sägezahnkurve mit Umkehrpunkten an der Wasseroberfläche und in 70 m Tiefe, während er mit 8-10 kn Geschwindigkeit von dem RRS "Discovery" geschleppt wurde, das in dem Meßgebiet 13 parallele Bahnen, mit je einer Länge von 12 sm und einer Seemeile Entfernung zueinander, abfuhr. Die Messungen ergaben über 1000 Profile in der oberen tropischen Temperatursprungschicht, in der sich auch das Salzgehaltsmaximum befand. Die in diesem Bericht veröffentlichten Ergebnisse zeigen die Veränderungen von Temperatur-, Salzgehalts- und Dichtestrukturen in horizontalen Skalen zwischen 1 km und 25 km. Es wurde in diesem Datenbericht weitgehend von dem Verfahren der Interpolation auf Dichteflächen Gebrauch gemacht. Auf diese Weise können Strukturen der quasi-geostrophischen Turbulenz von denen der internen Wellen getrennt werden. Die Darstellungen beinhalten Profile, vertikale Schnitte (Sections), Dichte- und Druckflächen (Maps) und Statistiken.

ACKNOWLEDGEMENTS

The fieldwork of the GATE Lagrangian batfish experiment was carried out on board RRS "Discovery" as a collaborative research project of the Department of Oceanography, University of Southampton and the Institute of Oceanographic Sciences, Wormley. Data analysis was started at the University of Southampton and completed at the Institut für Meereskunde an der Universität Kiel.

We thank our colleagues at IOS Wormley and the Captain and crew of RRS "Discovery" for their contributions which made the fieldwork possible.

The data were processed using software based on a system devised by Raymond Pollard and Gill Lawrence at the Atlas Computer Laboratory, Chilton and the Regionales Rechenzentrum für Niedersachsen, Hannover.

Financial support was provided by:

Natural Environment Research Council (Grants GR3/2194, GR3/2634)

Science Research Council (Computer time at Chilton)

Deutsche Forschungsgemeinschaft (Grants Wo254/1, Wo254/4, Wo254/6, Wo254/8).

The following members of the research team at Southampton and Kiel contributed to the production of this report:

Wolfgang Barkmann	Gordon Blanchard	Bernd Burkert
Mike Butterfield	Jürgen Fischer	Bernd Frantz
Dieter Helm	Stefan Hesse	George Kimber
Harry Leach	Manfred Lüdtke	Peter Minnett
Beryl Noyce	Bernd Reklies	Linda Warren
Jan Wenzel	John Woods	

SYMBOLS, UNITS AND NOMENCLATURE

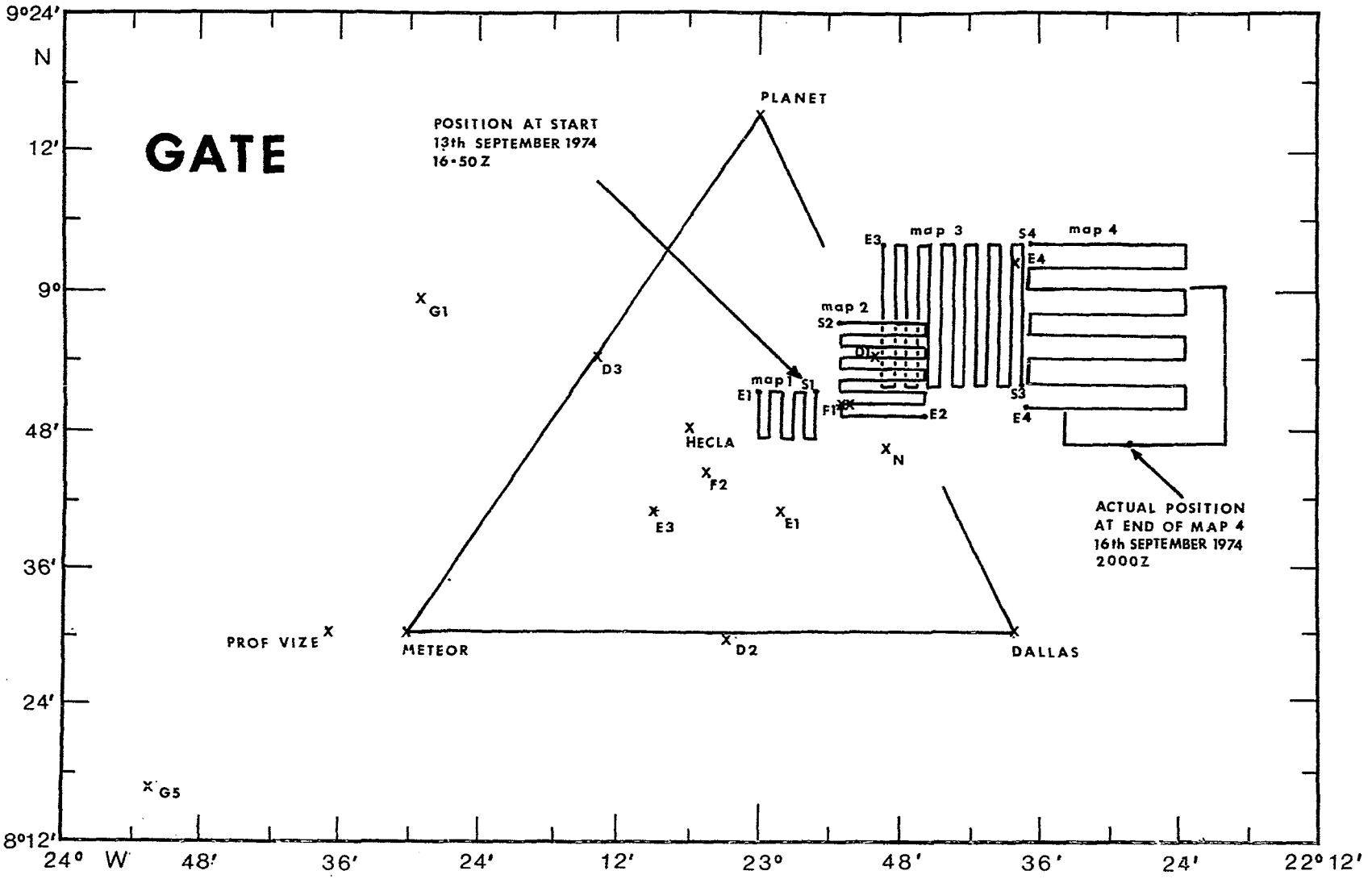
The data processing that led to the products in this report was largely completed before the publication of the IAPSO SUN Working Group report on the use of SI units in physical oceanography. In some computer plots reproduced in the report Roman capitals replace the recommended symbols. The main deviations are listed below:

Quantity	Units in Report	Recommendations
Atmospheric pressure	millibar (mbar,mb)	10^2 Pa
Oceanic hydrostatic pressure	decibar (dbar,db)	10^4 Pa
Thickness between two surfaces	decibar (dbar,db)	10^4 Pa
Salinity	ppt	10^{-3}
Density	Sigma-T (σ_t)	kg/m^3
Ship's speed	Knots	0,51 m/s

SECTION I INTRODUCTION

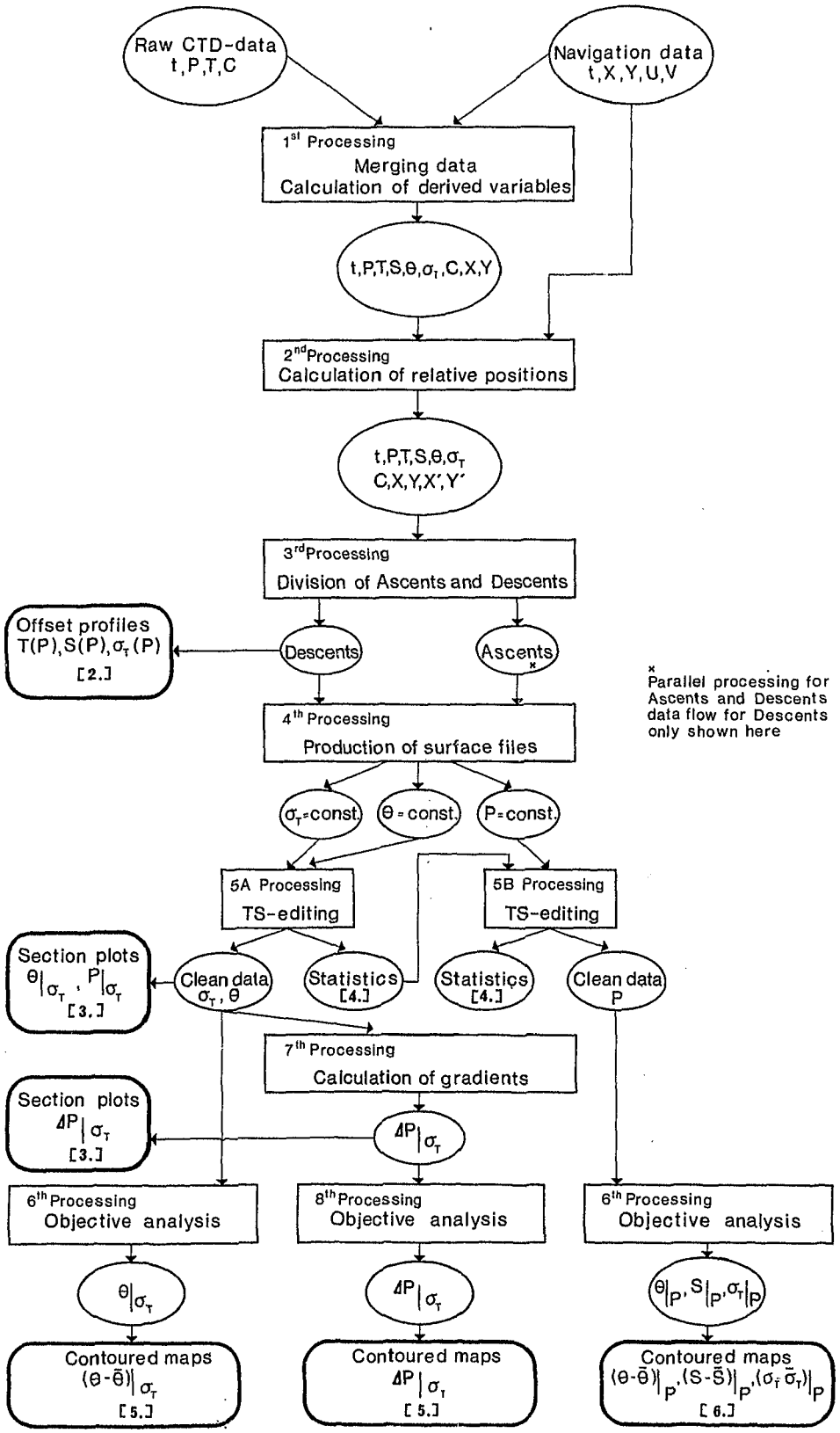
This Part of the GATE Lagrangian Batfish Experiment Data Report shows the data from Map 3L3. A detailed discussion of the whole experiment including data collection, data processing, estimation of errors and interpretation of the data is to be found in the GATE Lagrangian Batfish Experiment Summary Report (IFM Berichte Nr. 88). Map 3L3 is the third Map of the third Lagrangian Batfish Experiment and the data were collected between 0850 on 15.9.74 and 0633 on 16.9.74 in the position shown in the following diagram and comprises 13 Legs.

Section II contains Offset Profiles of potential temperature, salinity and σ_t as functions of pressure. These are the products of the third processing stage (see Data Processing Flow Diagram) where the navigation data have been merged with the CTD data and the ascents and descents separated. Section III contains section plots of the data along the individual Legs of the Map after the data have been interpolated onto standard surfaces (fourth processing) and the removal of bad data (fifth processing).
Section IV shows statistics of the data on standard surfaces, these are by-products of the fifth processing stage. Section V contains contoured maps of the distribution of potential temperature and of thickness (the spacing between isopycnic surfaces) on isopycnic surfaces; these are the products of the objective analysis (sixth and eighth processing stages). Section VI contains contoured maps of the distribution of potential temperature, salinity and density on isobaric surfaces. These are also products of the objective analysis (sixth processing stage).

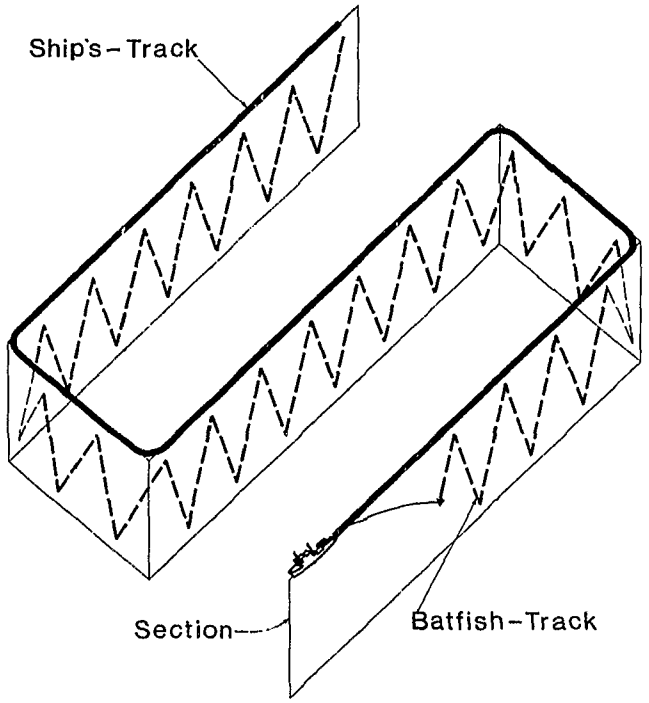


3rd LAGRANGIAN BATFISH EXPERIMENT

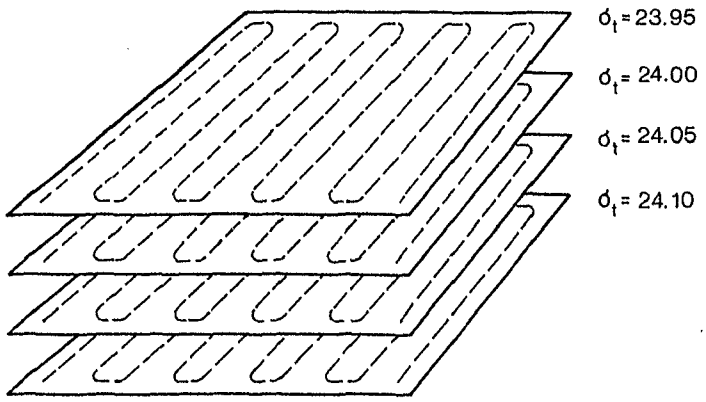
DATA PROCESSING FLOW DIAGRAM



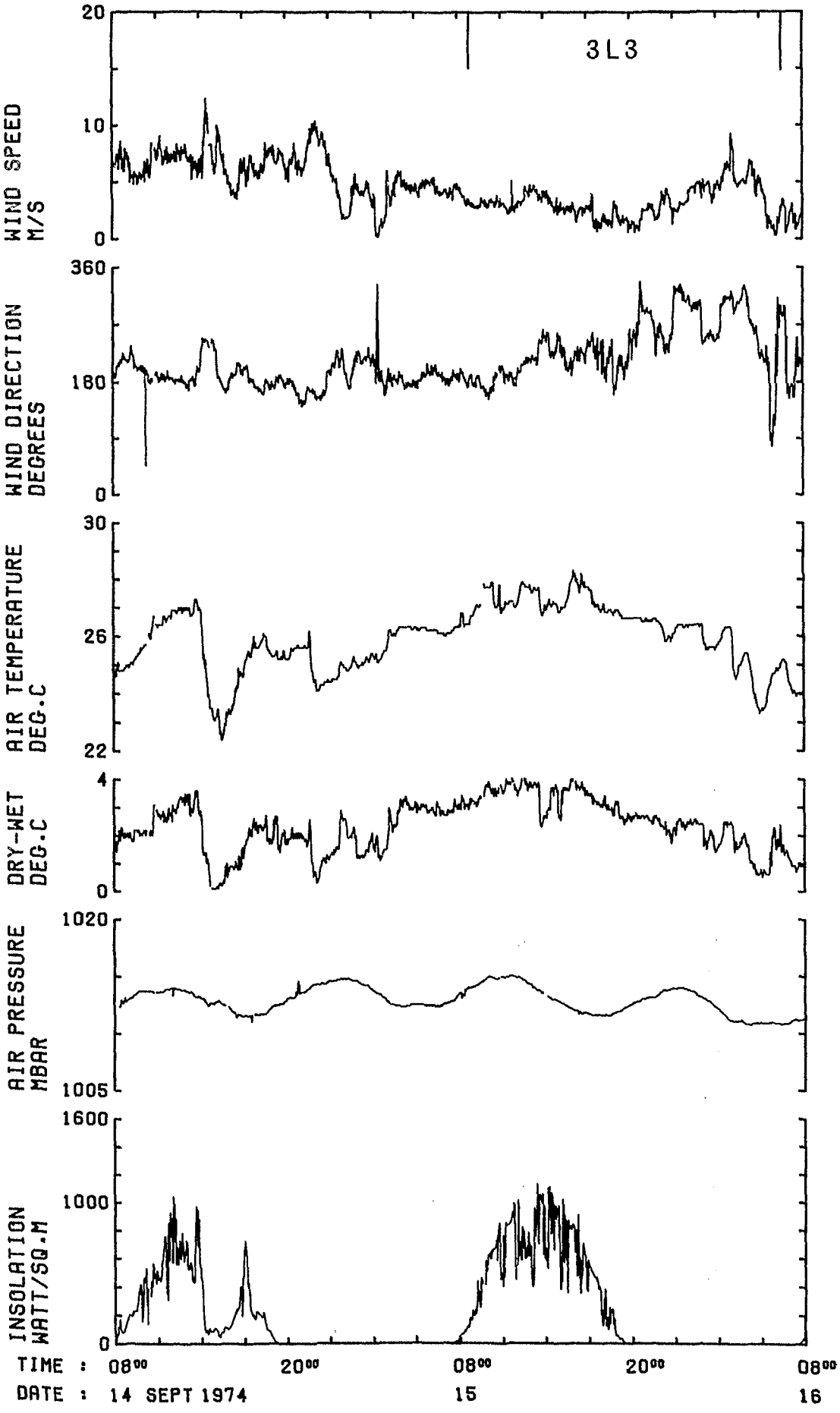
SCHEMATIC PRESENTATION OF BATFISH-TRACK



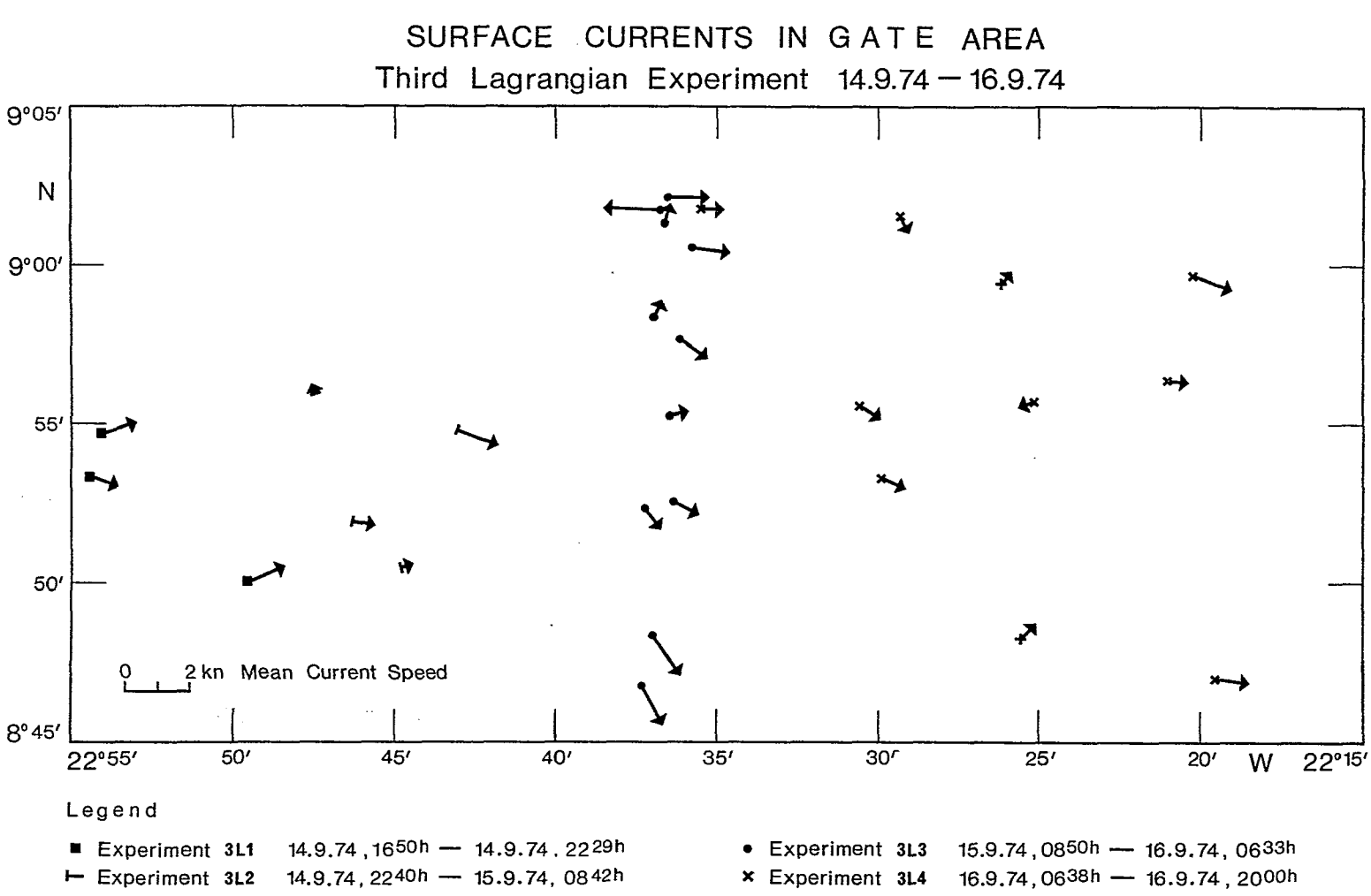
INTERPOLATION ON TO SURFACES



METEOROLOGICAL DATA



The meteorological data were collected by the standard meteorological instrumentation on board RRS "Discovery"



The surface currents were calculated from the difference in the positions of the ship obtained using a satellite fix and dead-reckoning using the ship's log signal integrated since the previous satellite fix.

SECTION II OFFSET PROFILES

In this Section profiles of potential temperature, salinity and σ_t as functions of pressure are shown. These are the data in time-series form prior to the interpolation onto standard surfaces and prior to the removal of bad data (see Data Processing Flow Diagram in Section I). The data are shown in the order potential temperature, salinity and σ_t for each of the 13 Legs of the Map*. The individual diagrams are labelled with the file name of the data which is related to the leg number. The following table shows the start and end times and the Filename for each Leg.

		start		end	
Leg Number	Filename	date	time	date	time
1	GCTDØ75AD	15.9.	0850	15.9.	1027
2	GCTDØ76AD		1027		1208
3	GCTDØ77AD		1208		1354
4	GCTDØ78AD		1354		1535
5	GCTDØ79AD		1535		1719
6	GCTDØ8OAD		1719		1854
7	GLØ81AD1 GLØ81AD2		1854		2050
8	GCTDØ82AD		2050		2225
9	GCTDØ83AD		2225	16.9.	0006
10	GCTDØ84AD	16.9.	0006		0155
11	GCTDØ85AD		0155		0318
12	GCTDØ86AD		0318		0455
13	GCTDØ87AD		0455		0633

*For the sake of clarity it was found necessary to keep the scale of diagrams variable.
During the processing of the data several profiles were lost in Leg 7. Therefore it was divided into two plots with different filenames.

GCTD075AD

-1 937 seiford test 40-

-Offset Profiles LEG 1-

- 1 OCT Profile test -

POT.TEMP DEGREES C OFFSET=10.00

19.00 35.25 51.50 67.75 84.00 100.25 116.50 132.75 149.00

PRESSURE DECIBARS

0.00 30.00 60.00

GCTD076AD

PRESSURE DECIBARS

0.00 30.00 60.00

PRESSURE DECIBARS

0.00 30.00 60.00

PRESSURE DECIBARS

0.00 30.00 60.00

19.00 35.25 51.50 67.75 84.00 100.25 116.50 132.75 149.00

-2 CTD Profiles LEG 2-

-2 037 Profile test-

-Offset Profiles LEG 2-

-Offset adjusted 3 DBAR-

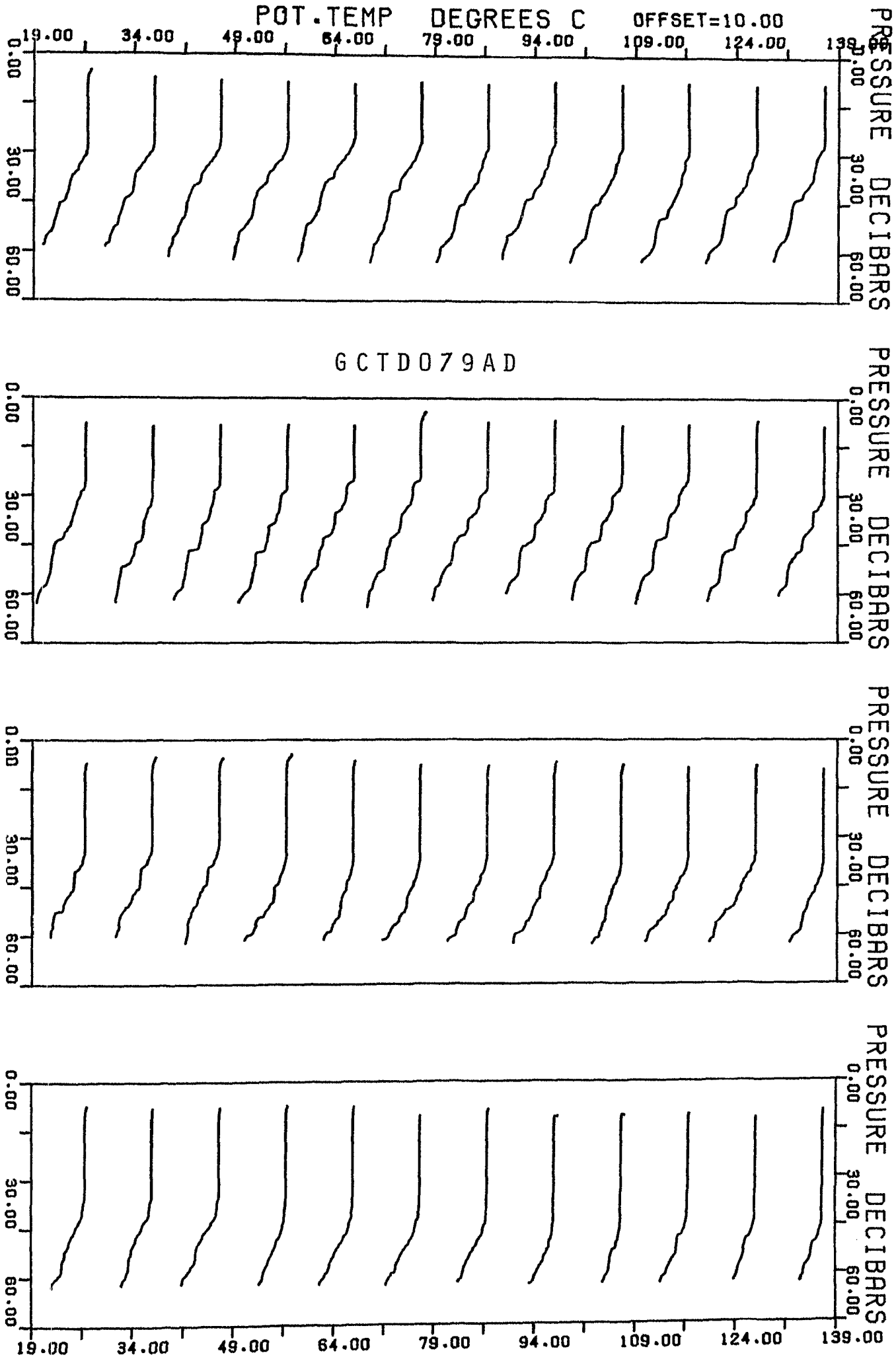
-Offset Profiles 1EO 3-

-Offset Profiles LEG 3-

-4 037 salinity test-

-4 CET Profile test 40-

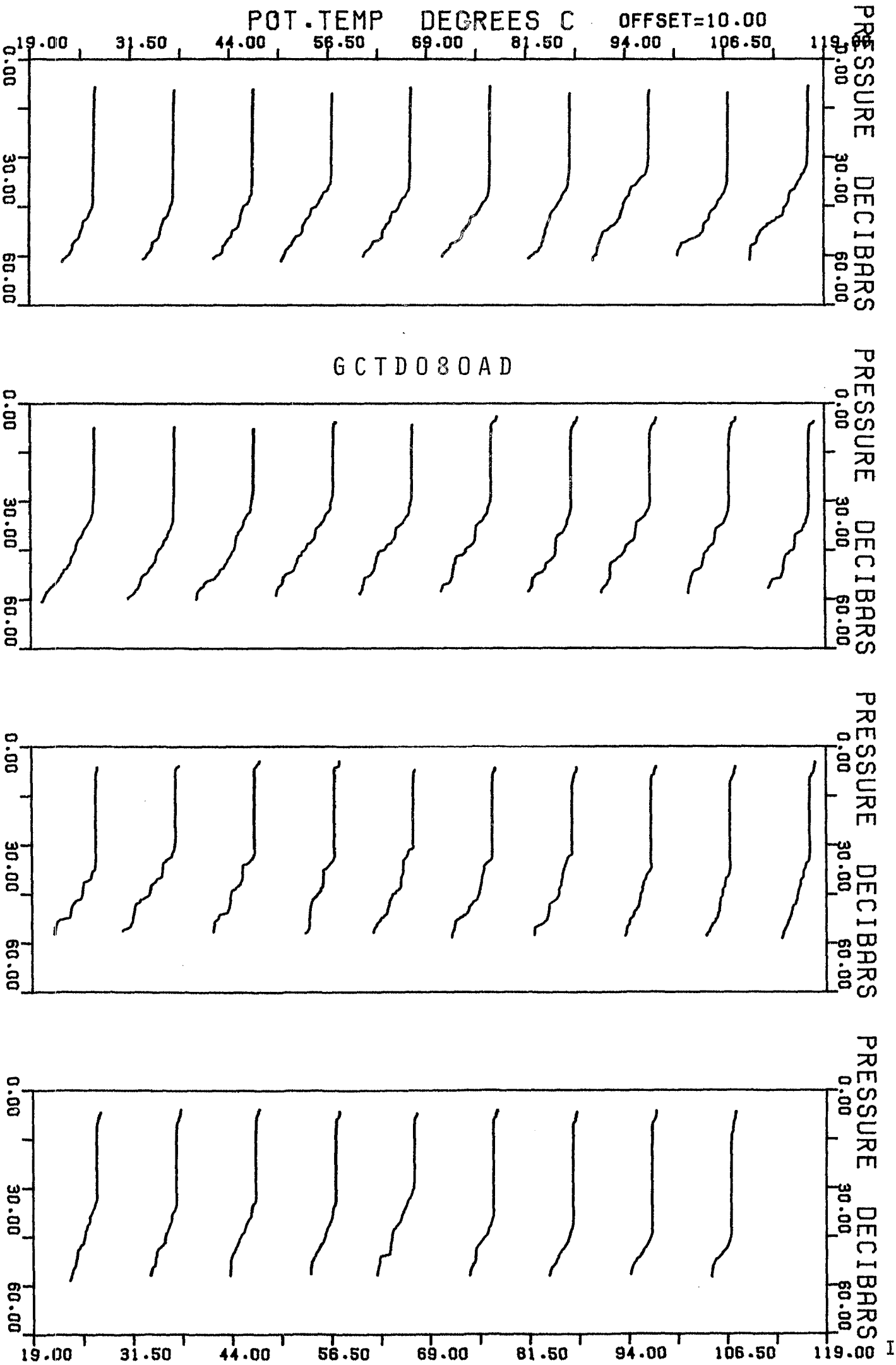
-Offset Profiles LEG 4-



-Offset Profiles LEG 5-

-Offset Profiles CEO 57-

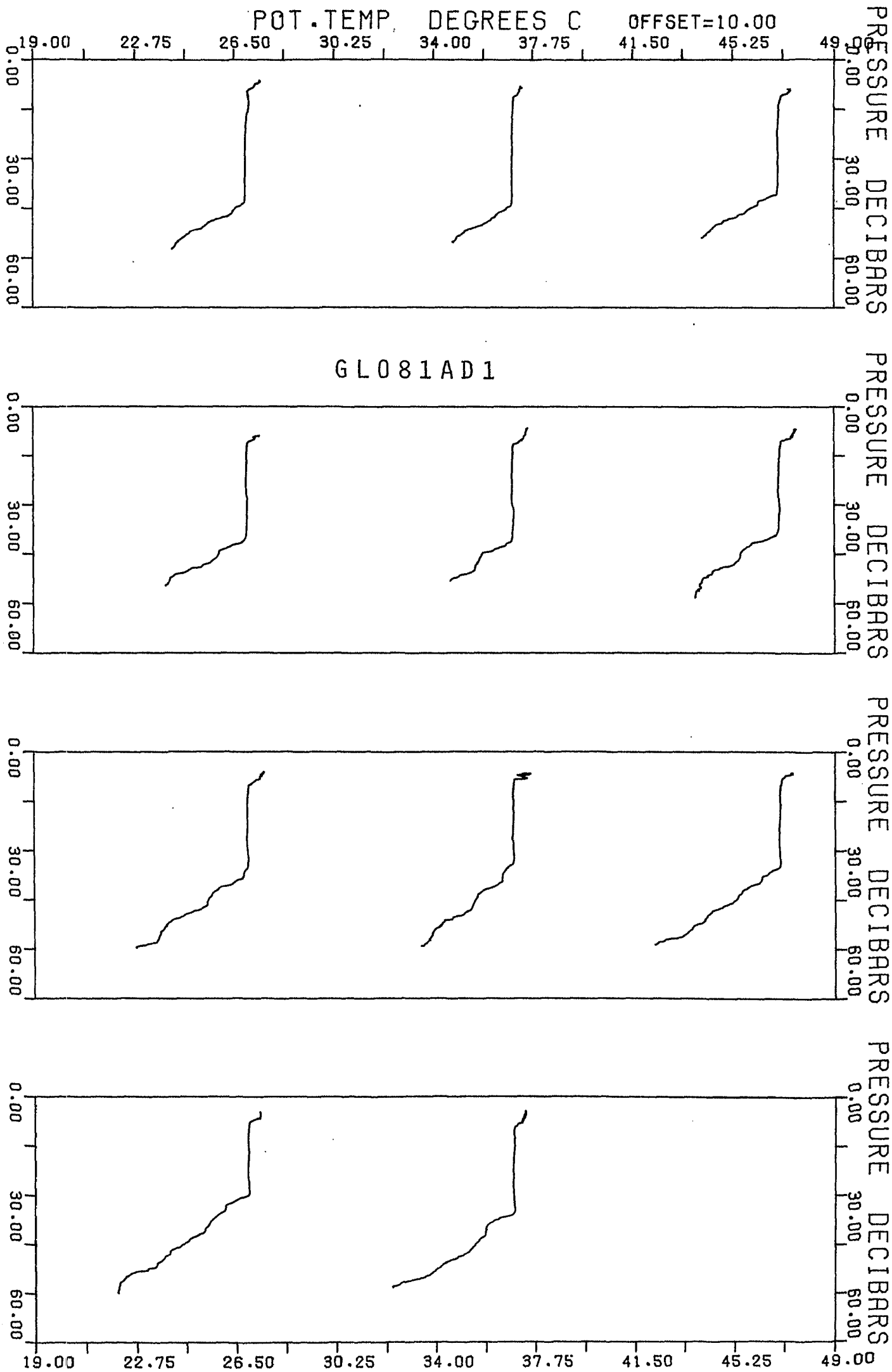
Profil test 3E7 5-



-9 GE7 setifoPd testfO-

-Offset test LEG 6-

-9 937 profile test10-



-Offset Profiles LEG 7-

-OFF set test Profiles LEG 7-

-CTD Profiles LEG 7-

GL081AD2

-Offset Profiles LEG 7-

- 7 GE7 selifford test40 -

-7 OCT Profiles setfjord test10-

POT.TEMP DEGREES C OFFSET=10.00

19.00 34.00 49.00 64.00 79.00 94.00 109.00 124.00 139.00

PRESSURE DECIBARS

0.00 30.00 60.00

GCTD082AD

PRESSURE DECIBARS

0.00 30.00 60.00

PRESSURE DECIBARS

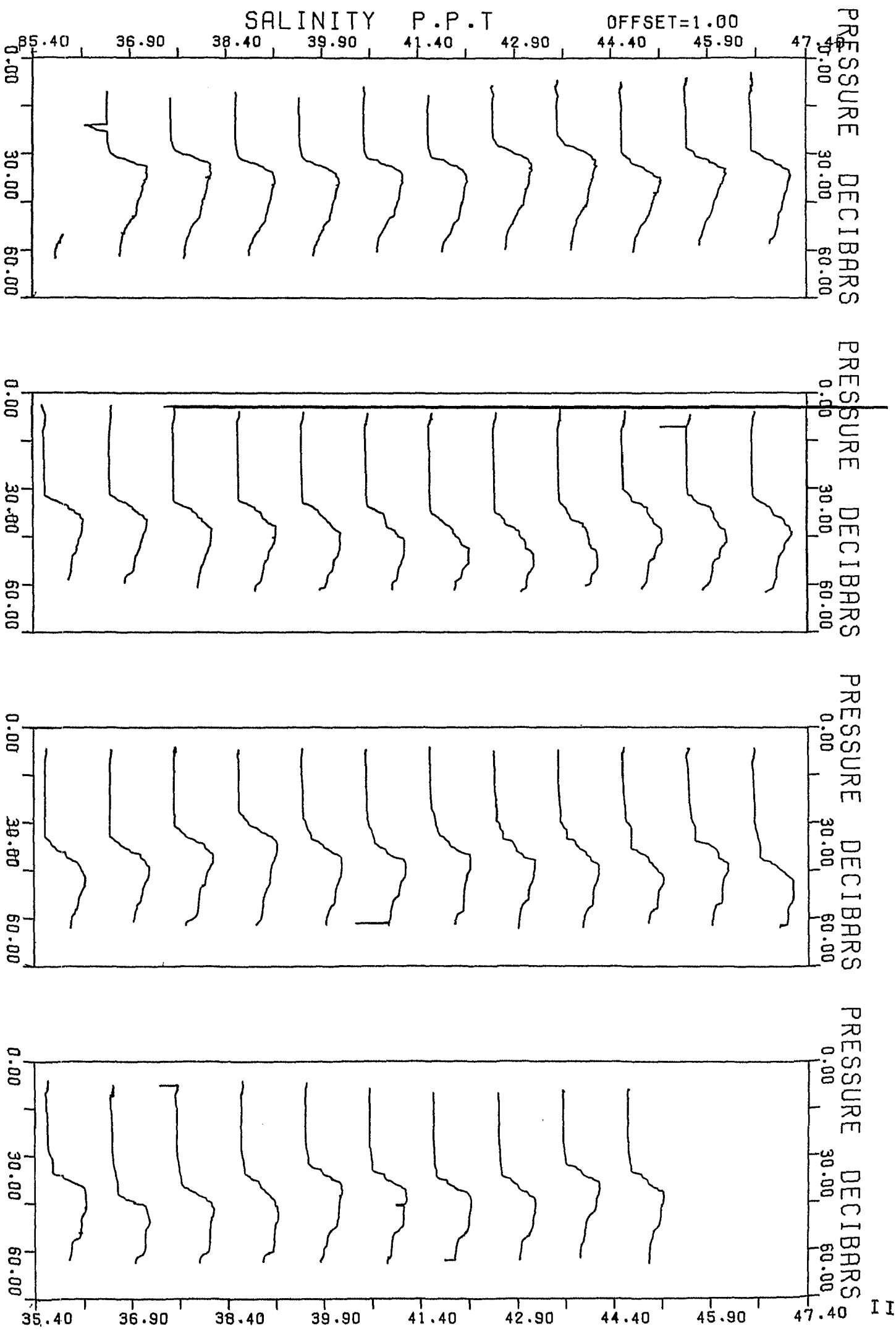
0.00 30.00 60.00

PRESSURE DECIBARS

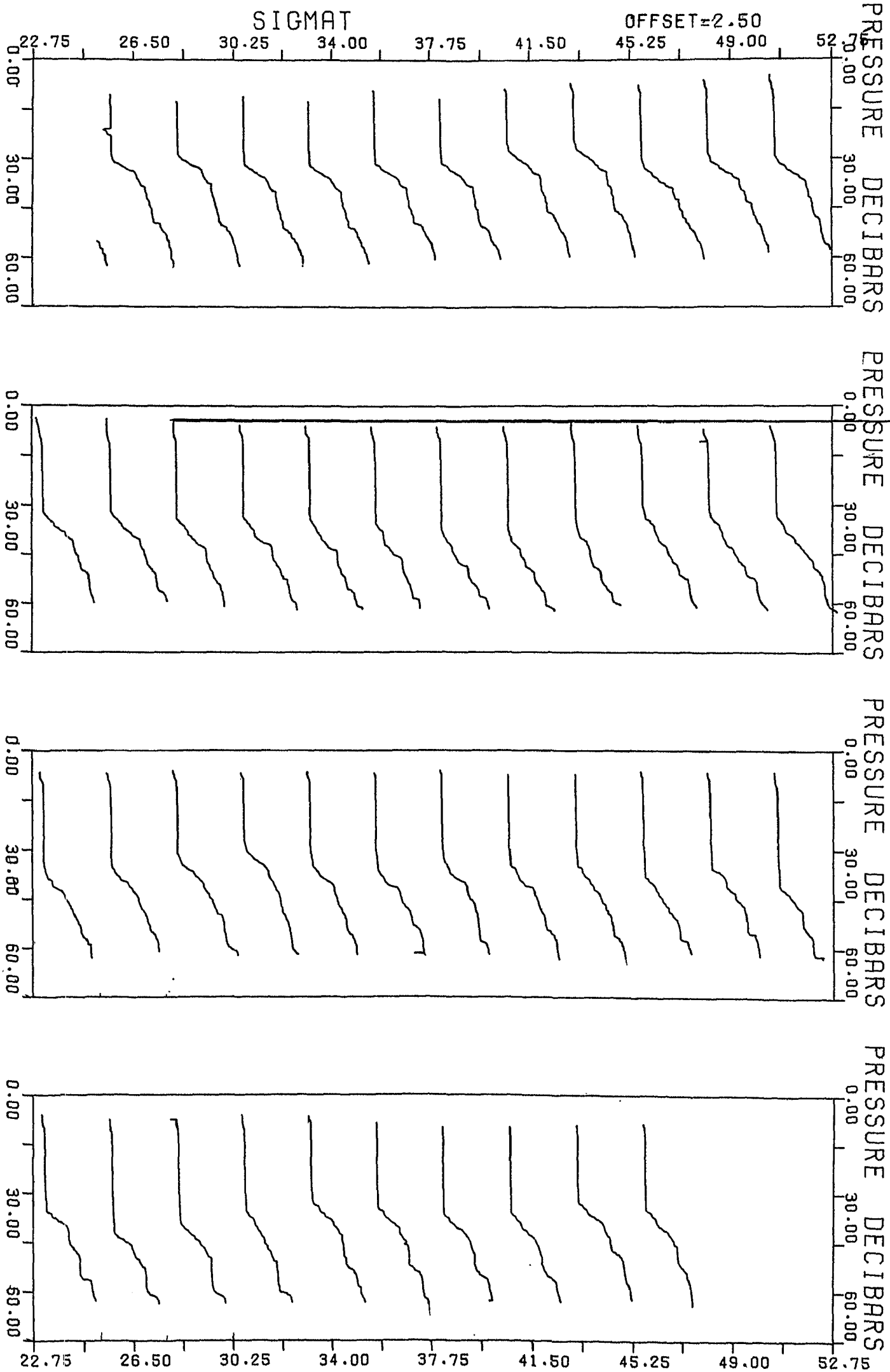
0.00 30.00 60.00

19.00 34.00 49.00 64.00 79.00 94.00 109.00 124.00 139.00

-8 CE7 Profiles testfo-



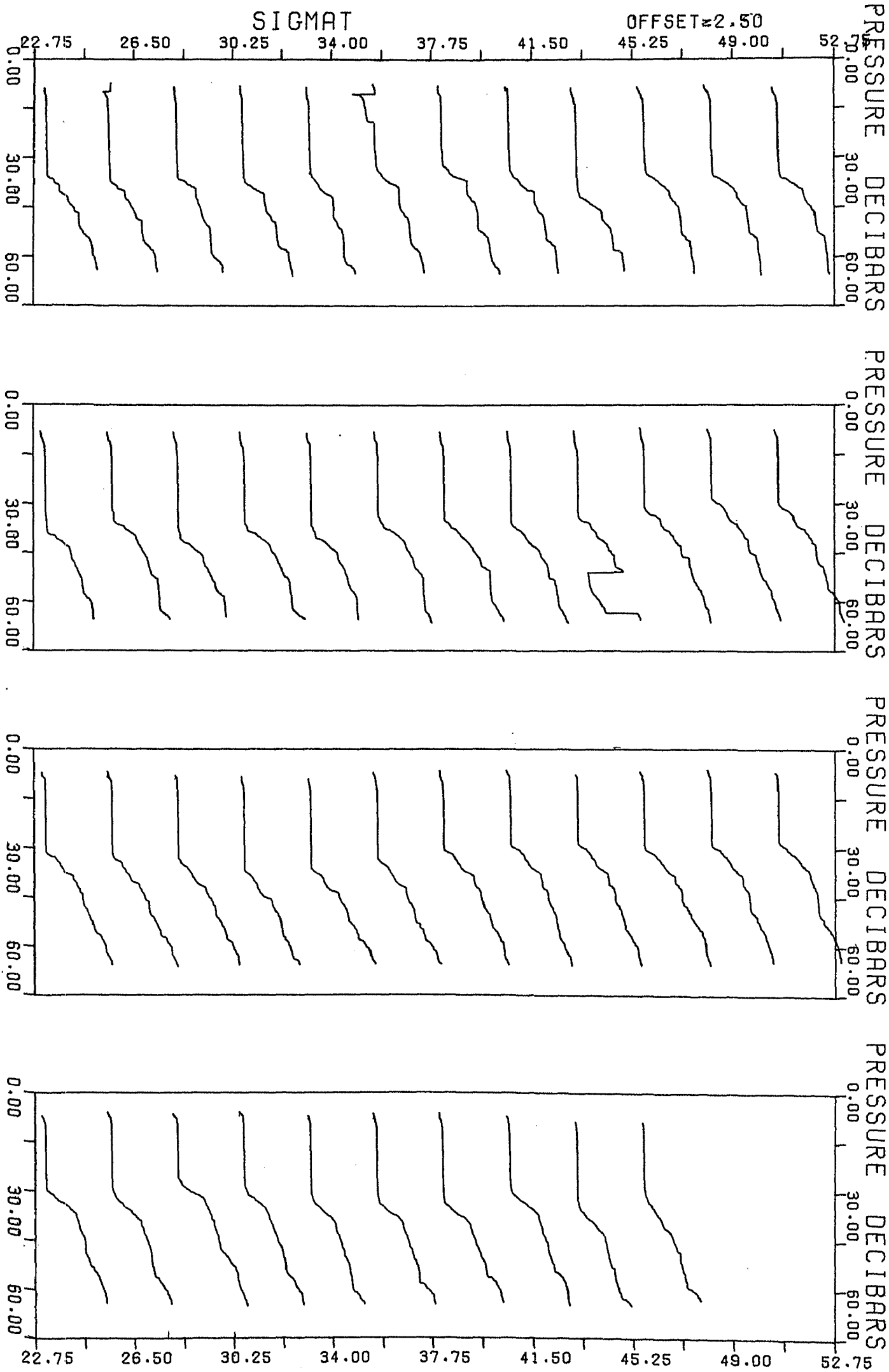
-Offset Profiles LEG 8-



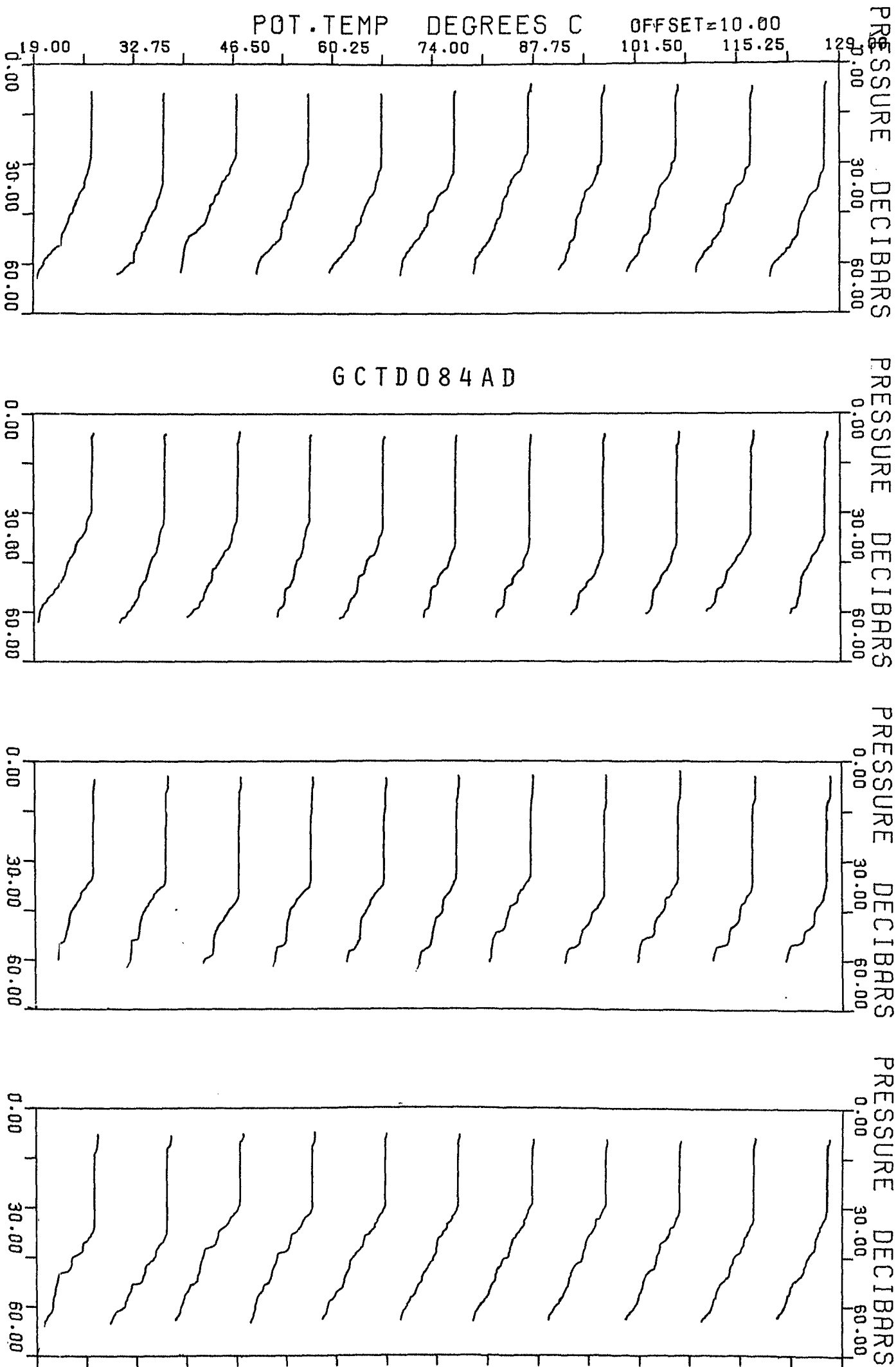
-Offset Profiles LEG 8-

-6 037 selifprd test10-

-6 OCT Profile test-



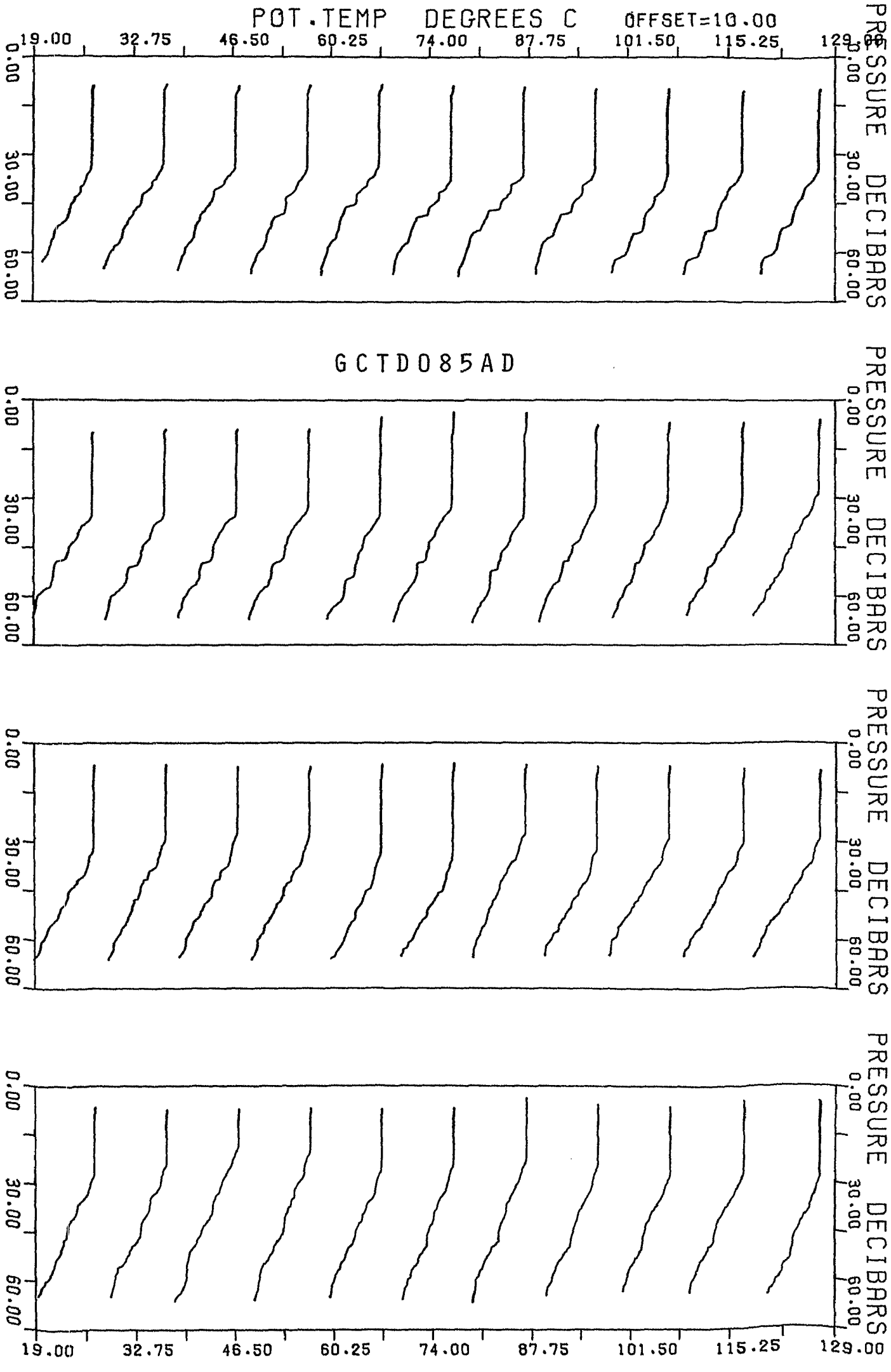
-Offset Profiles LEG 9-



-01 OE7 Profiles setsfto-

-01 037 salinity test10-

-01 937 Milford test10-

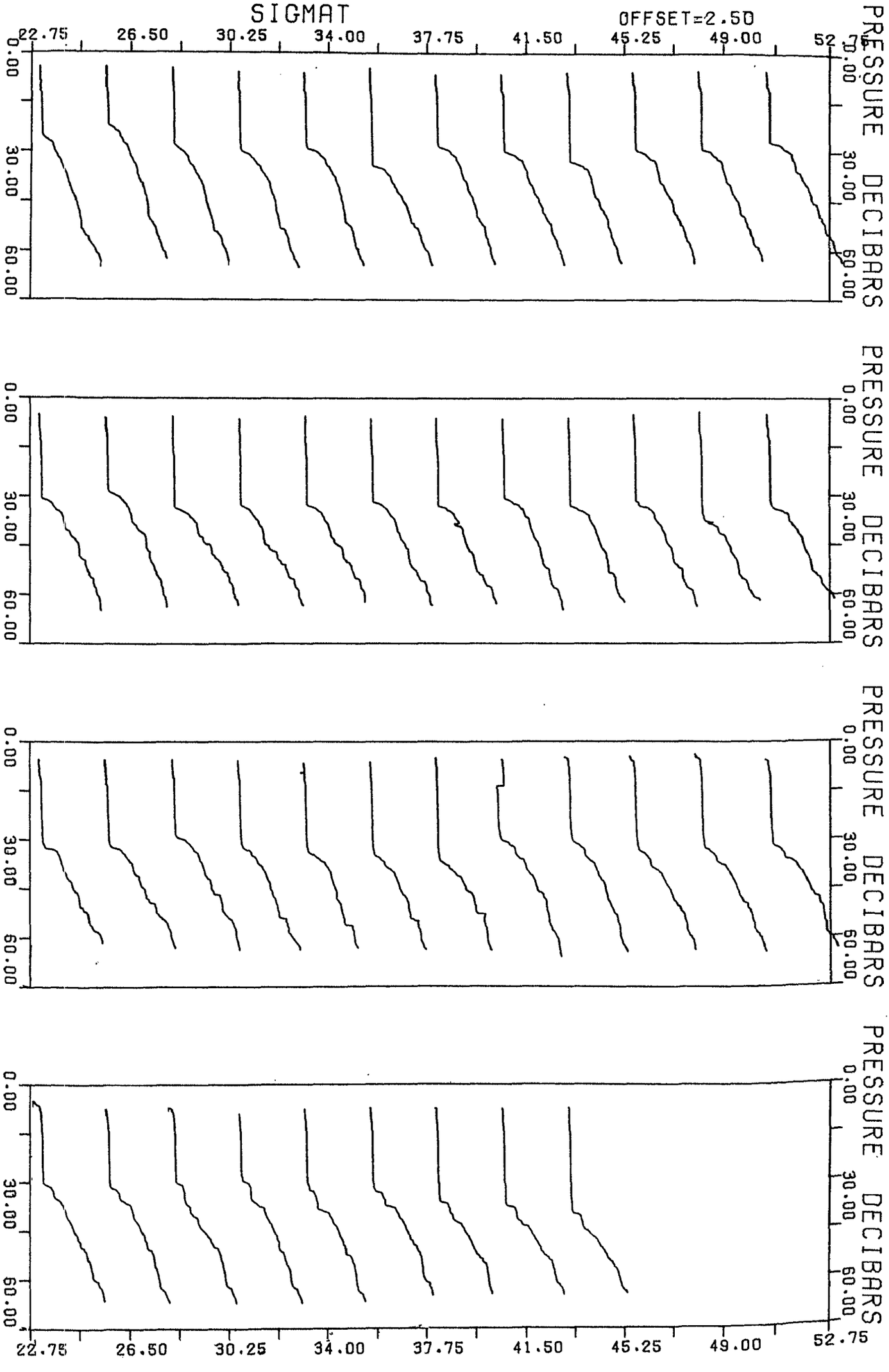

POT.TEMP DEGREES C OFFSET=10.00
19.00
32.75
46.50
60.25
74.00
87.75
101.50
115.25
129.00
PRESSURE DECIBARS
0.00
30.00
60.00
GCTD085AD

-11 OCT 1987 profiles test40-

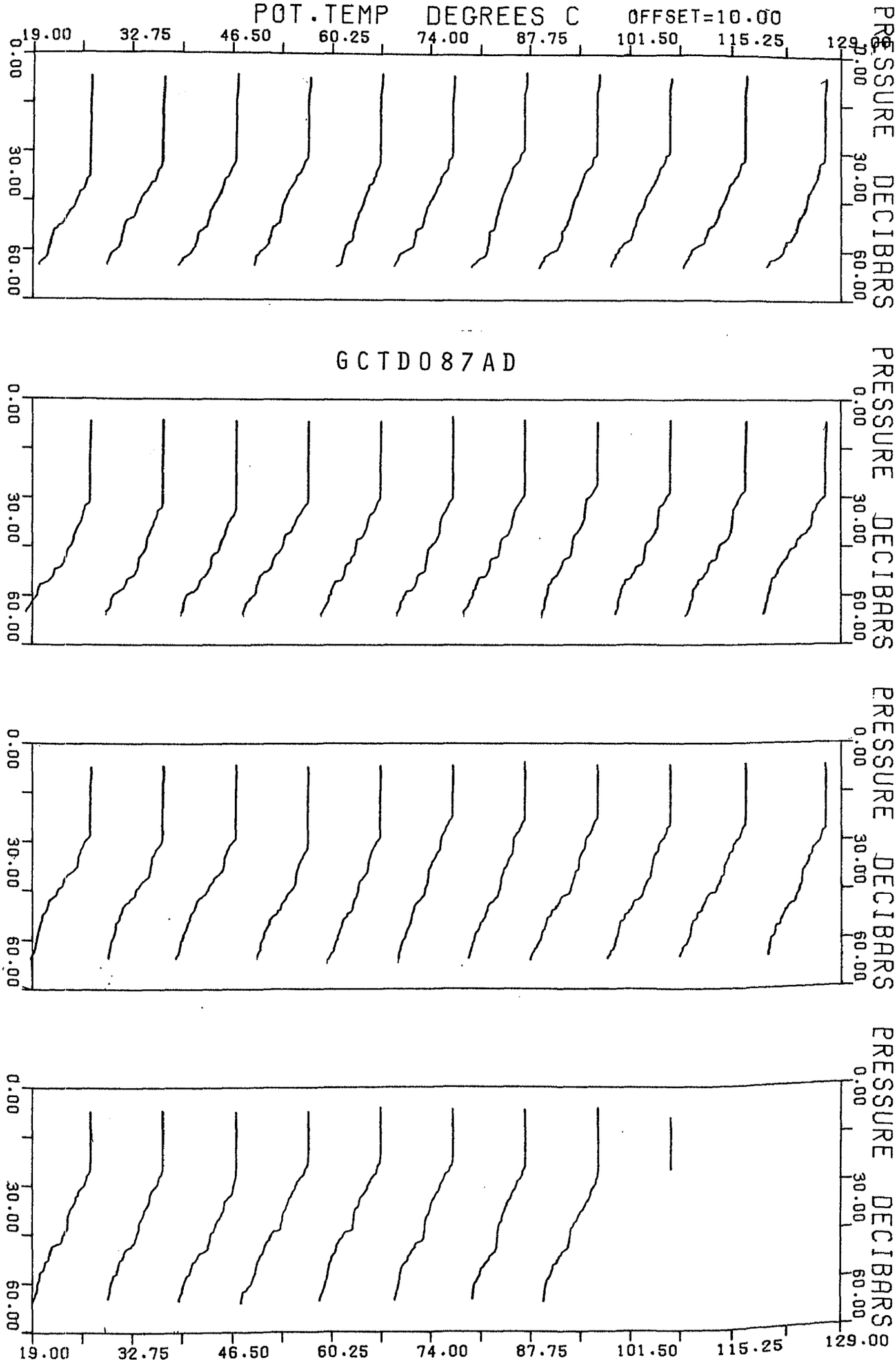
-11 GEJ setiford test10-

-21 037 salinity test10-

-21 OCT Profiles LEG 12-



-Offset Profiles LEG 12-



-Offset Profiles LEG 13-

-Offset Profiles LEG 13-

-Offset Profiles LEG 13-

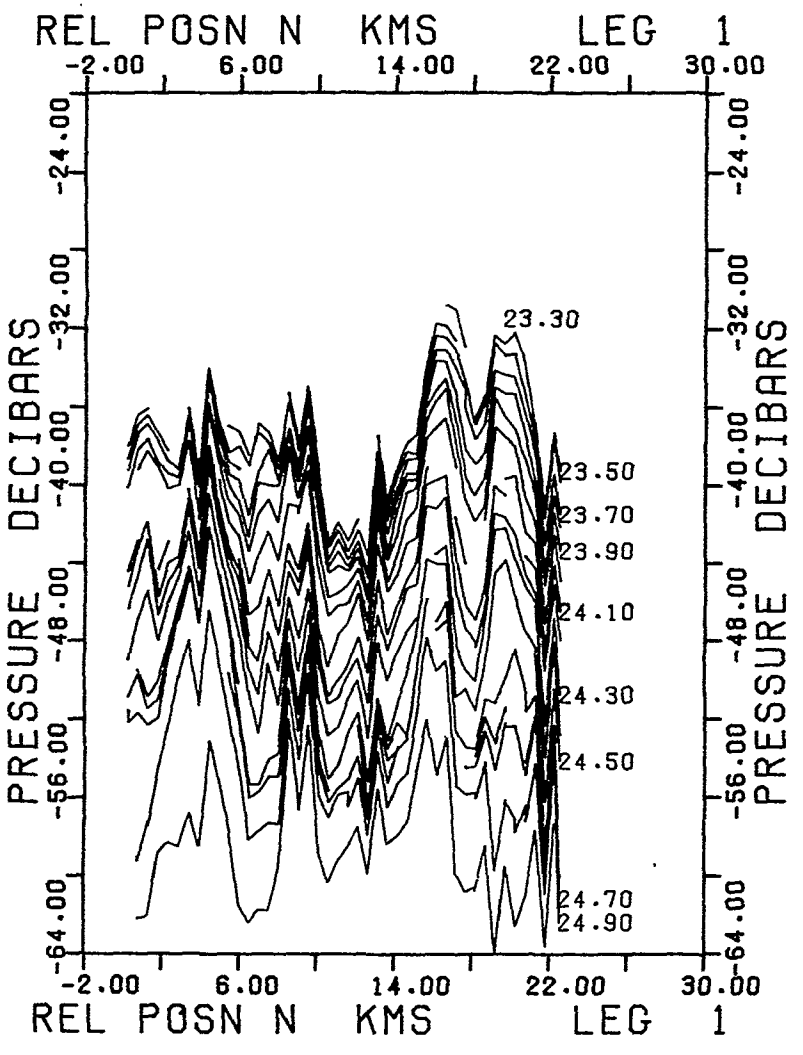
SECTION III SECTION PLOTS

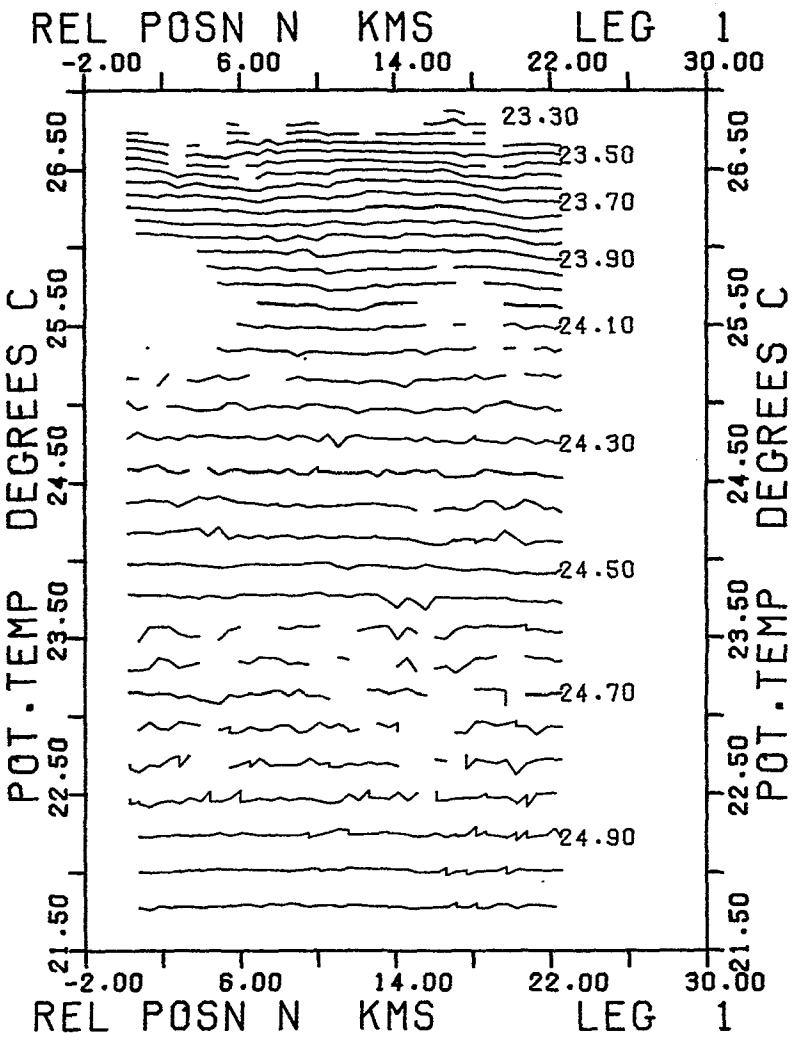
This section shows plots of sections along the 13 Legs of the survey handled in this volume. These are the data after interpolation onto standard sufaces of σ_t and after removal of bad data (stage 5 and 7 of data processing; see the flow diagram in section I). The start and end times for each Leg are shown in section II.

1. Potential temperature and pressure on surfaces of constant σ_t in the range σ_t = 23.30 - 25.00.

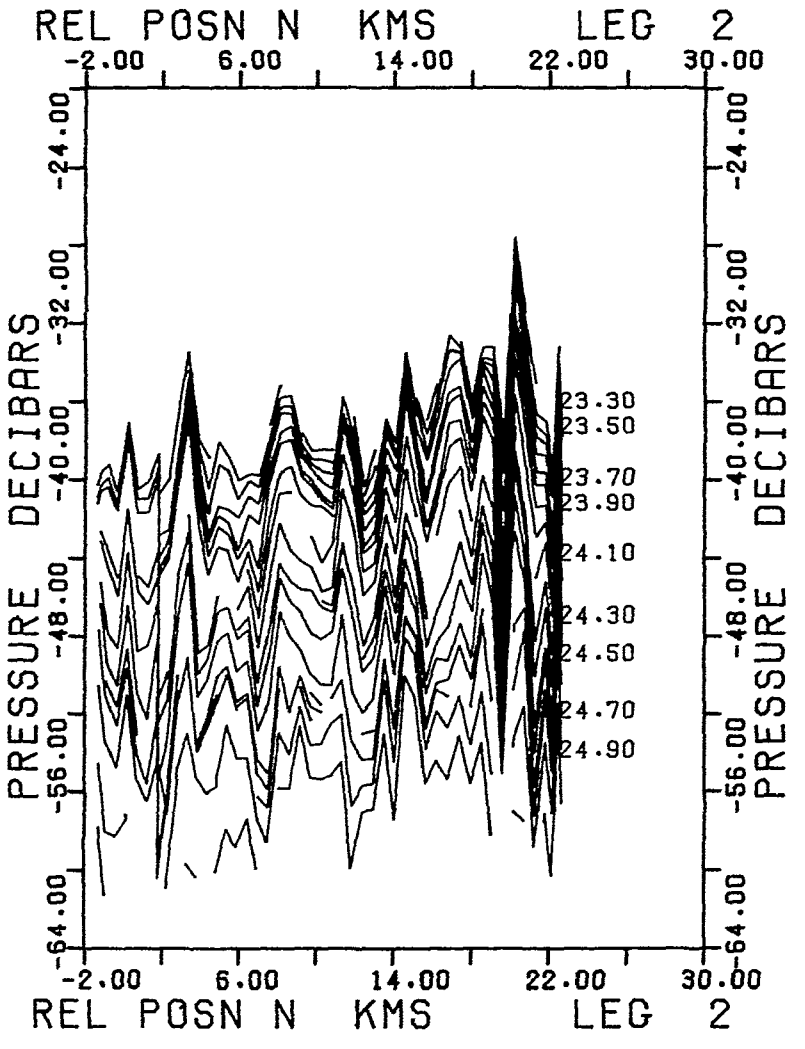
Contour interval for potential temperature on isopycnals 0.05 σ_t

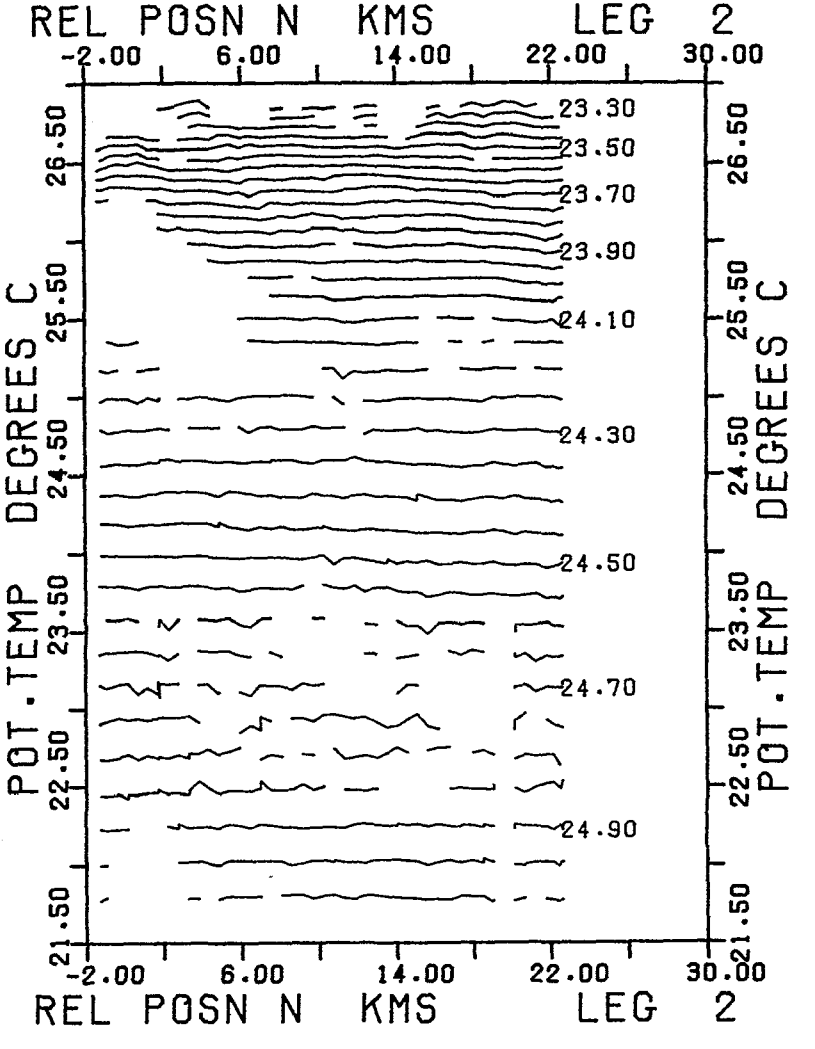
for pressure on isopycnals 0.10 σ_t



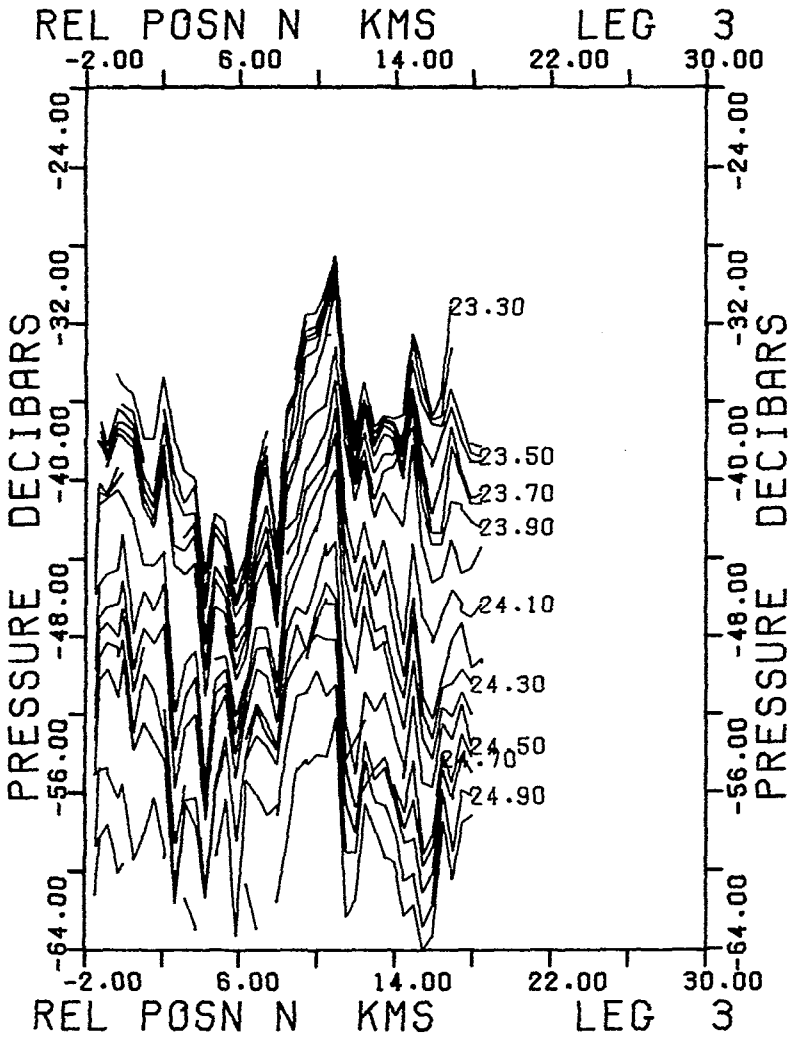


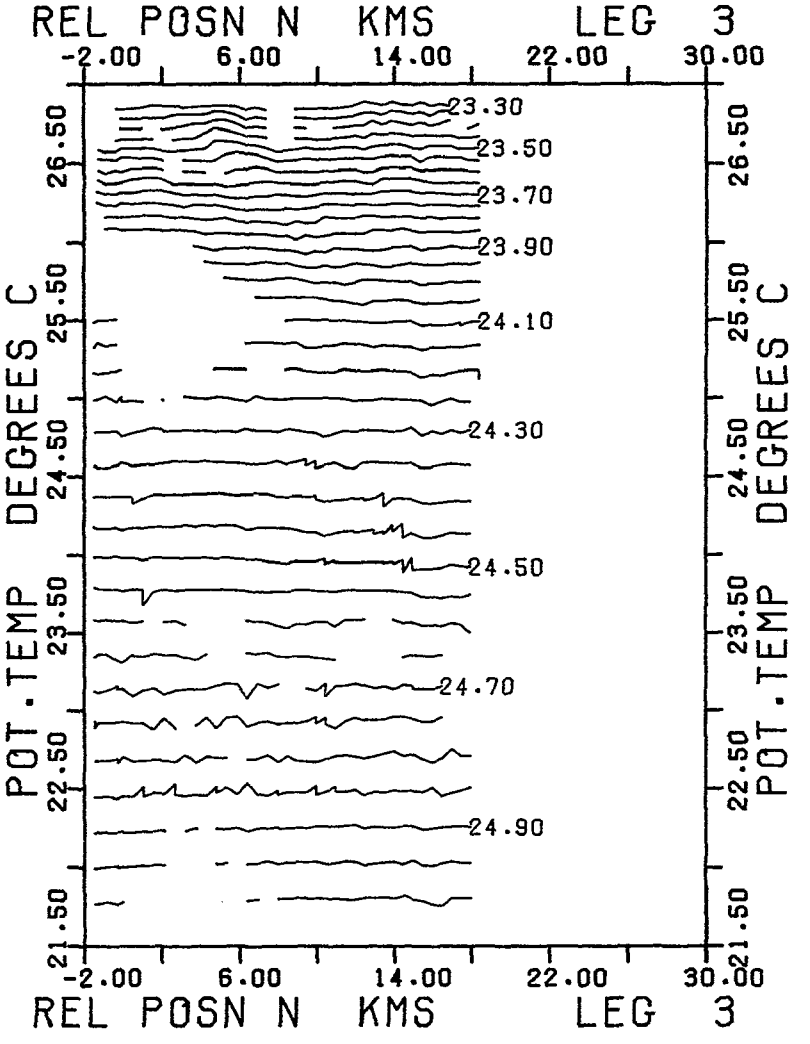
-P and T on Isopycnals-



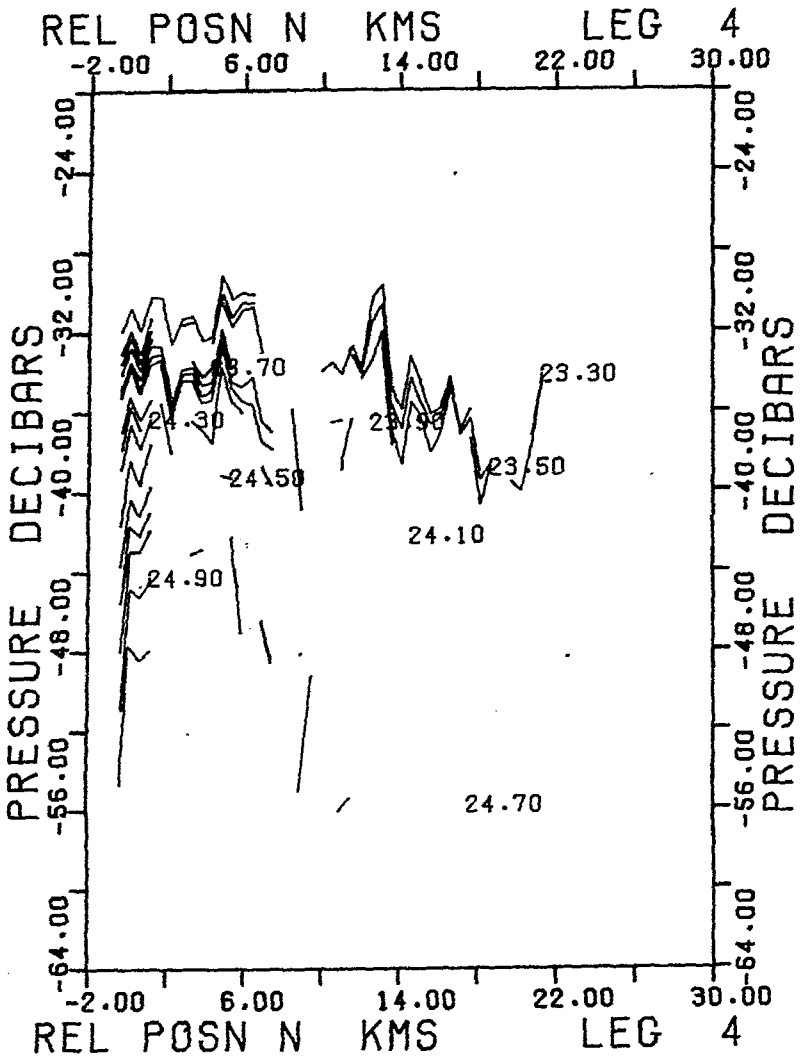


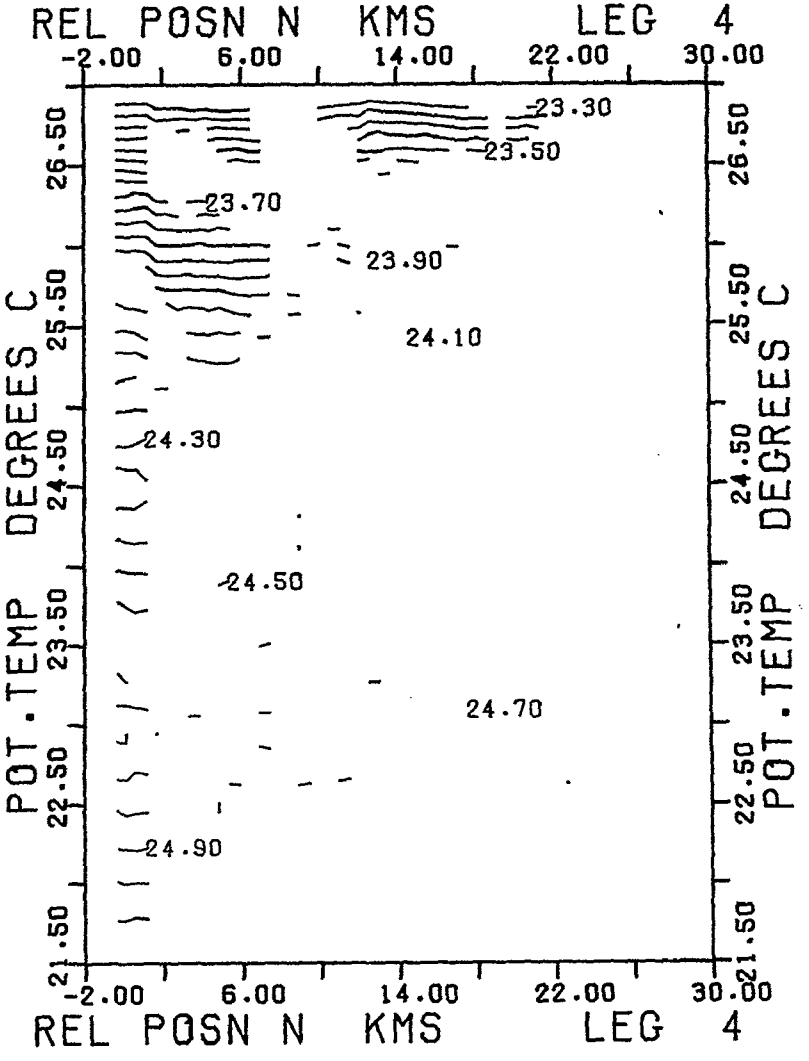
-P and T on Isopycnals-



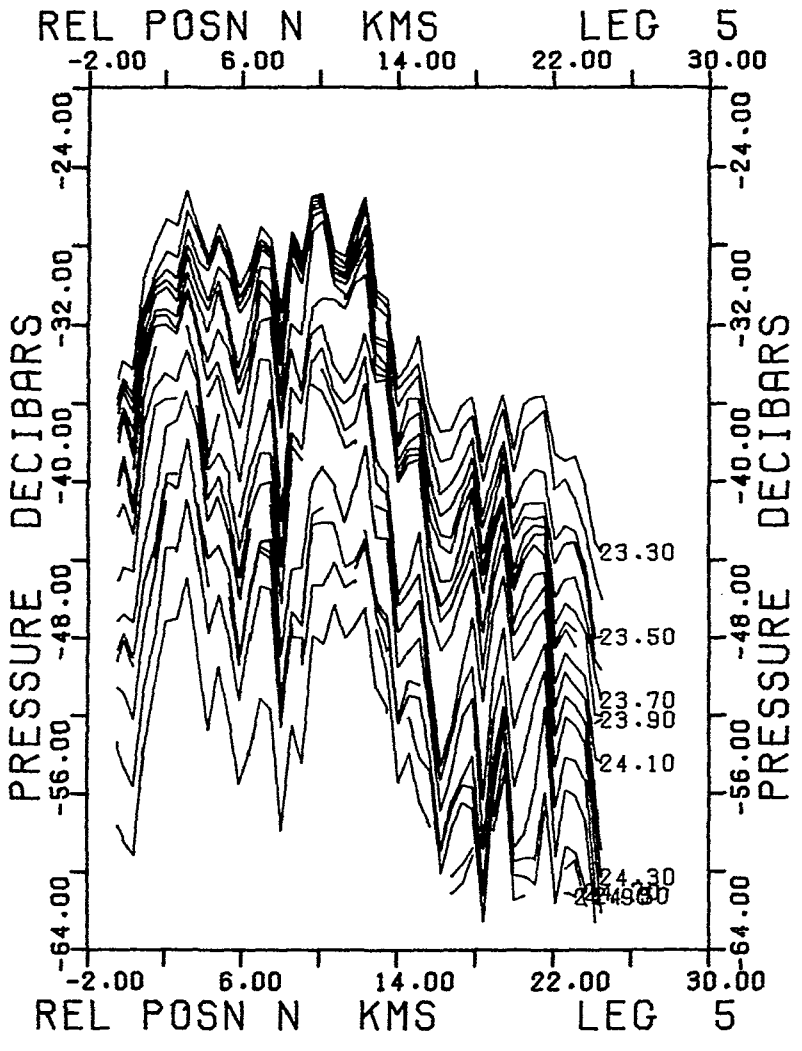


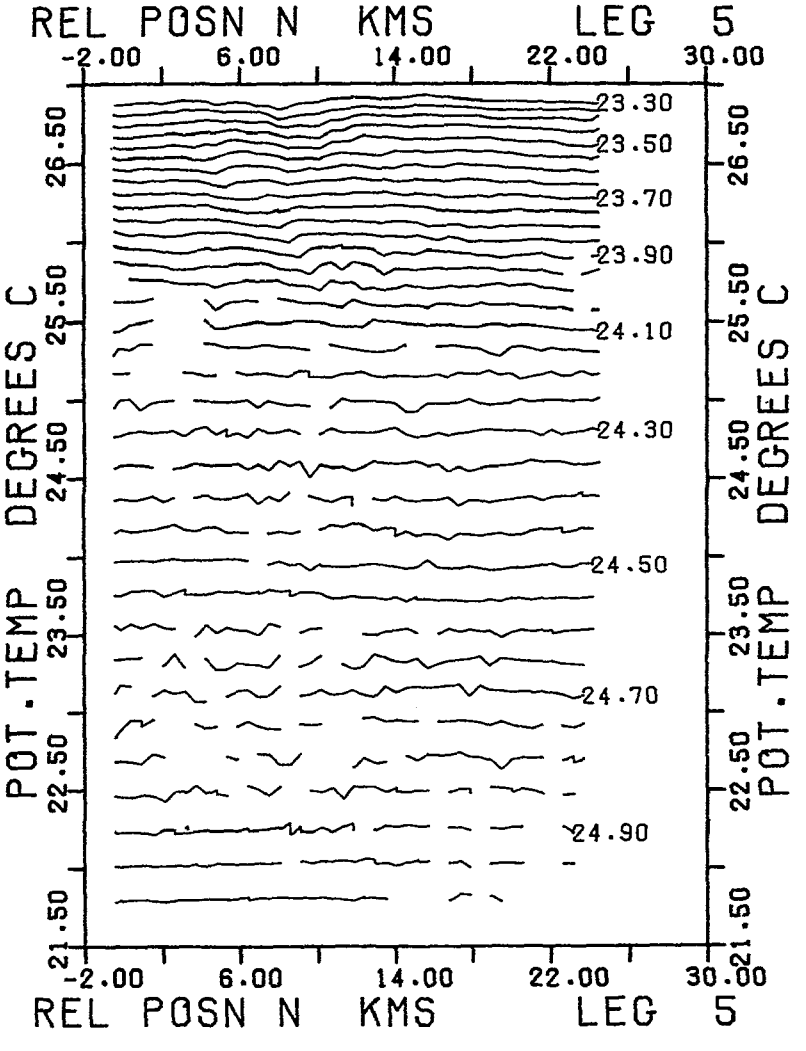
-P and T on Isopycnals-



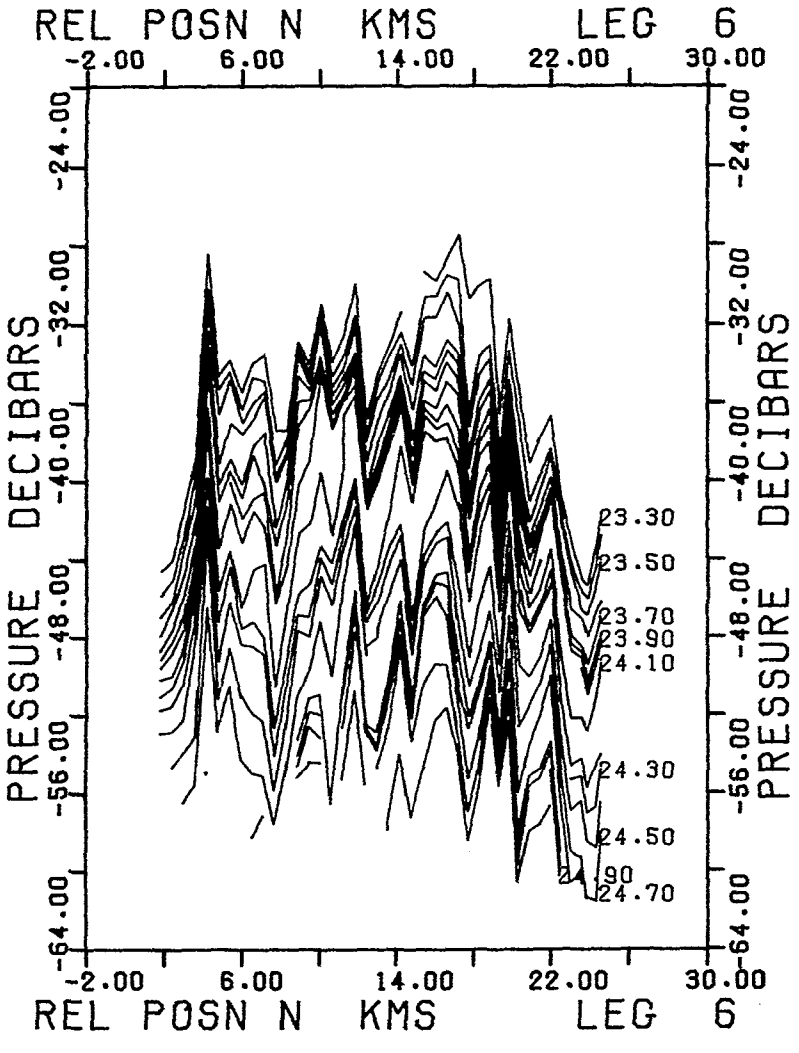


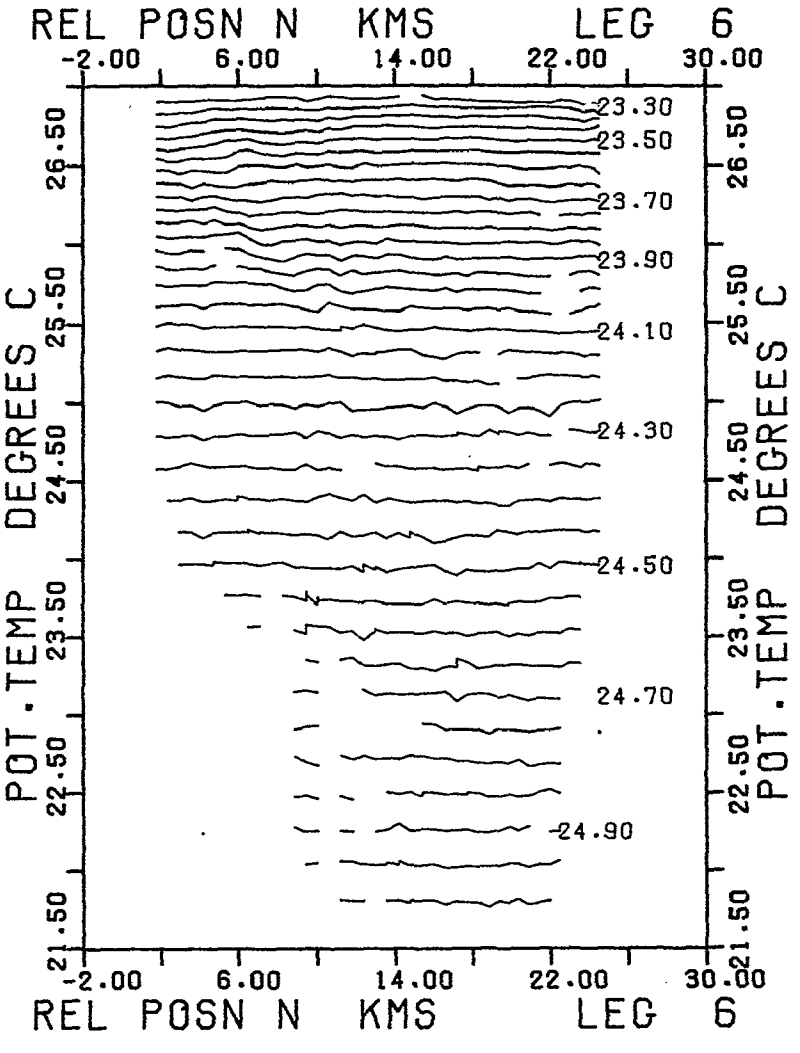
-P and T on Isopycnals-



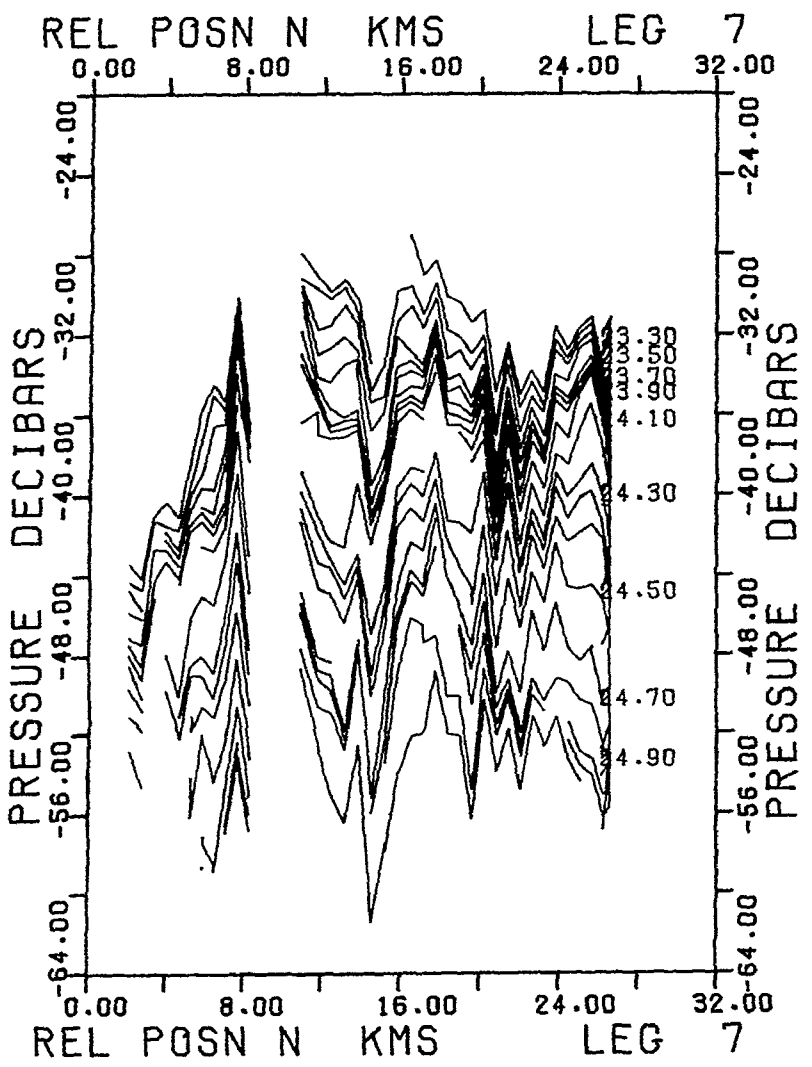


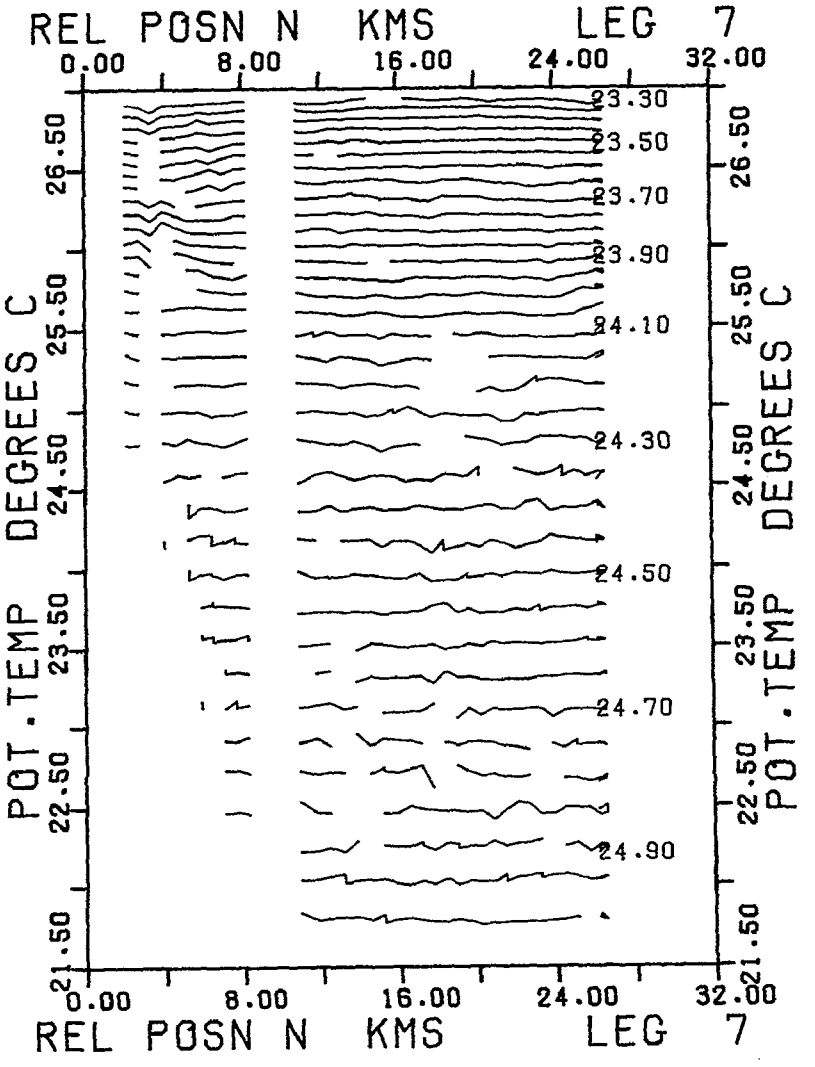
-P and T on Isopycnals-



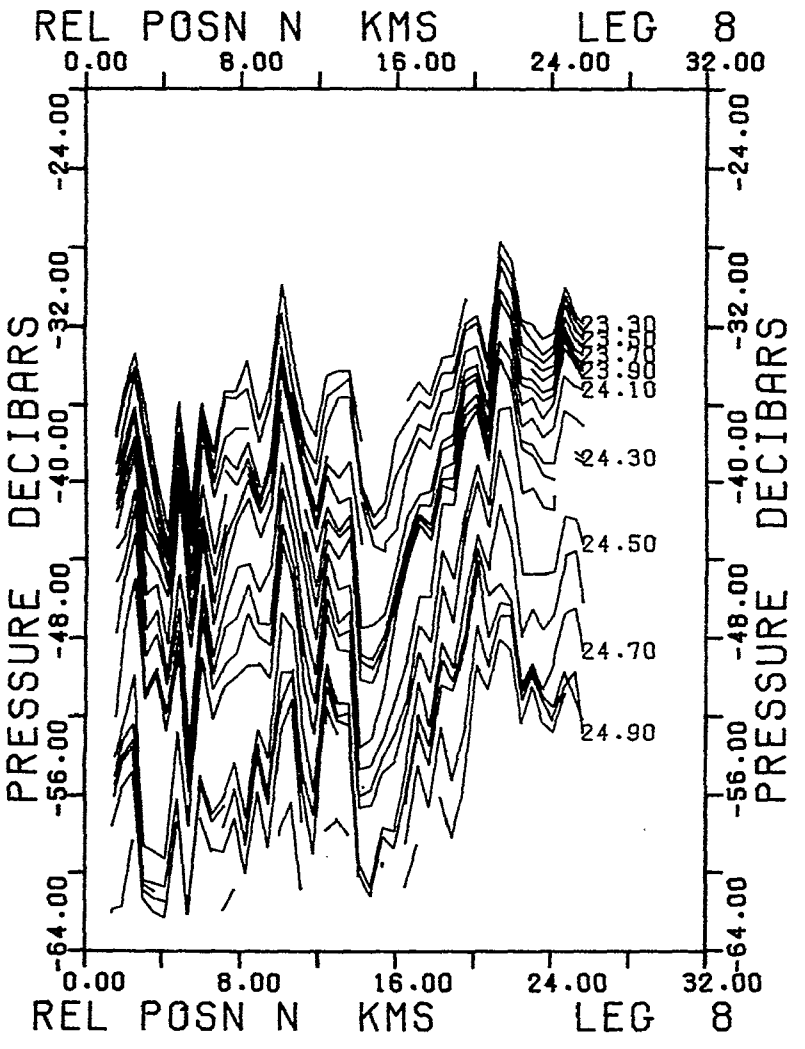


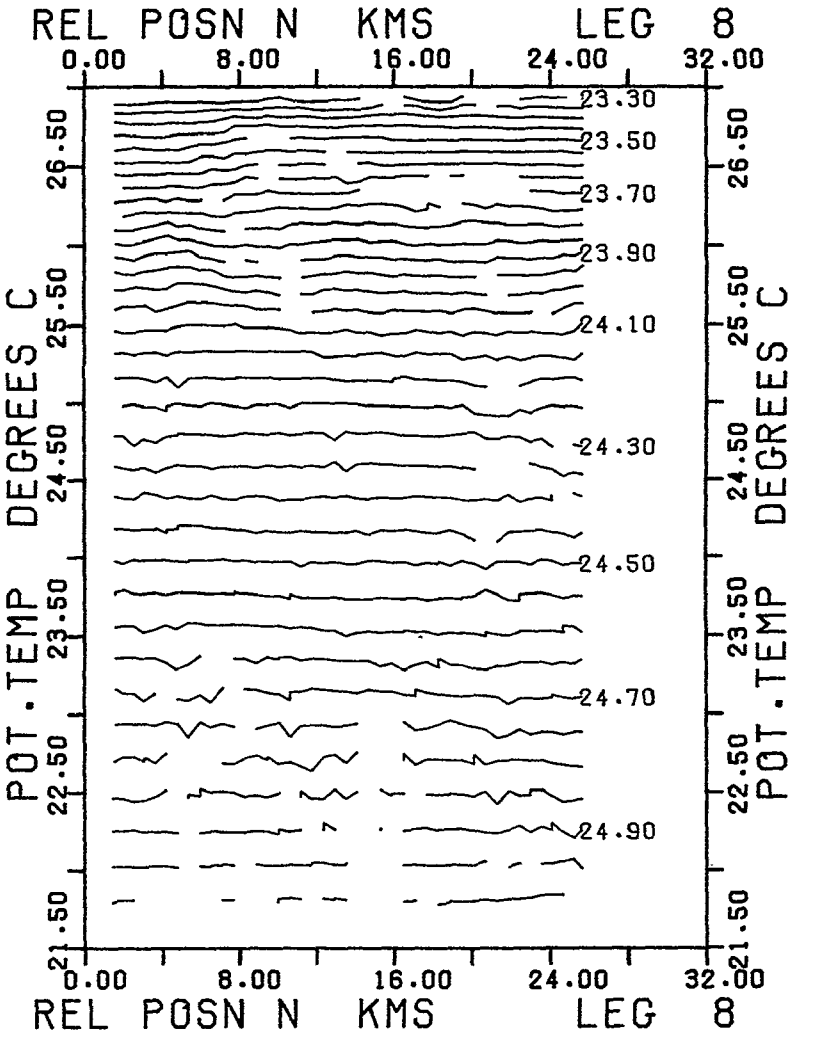
-P and T on Isopycnals-



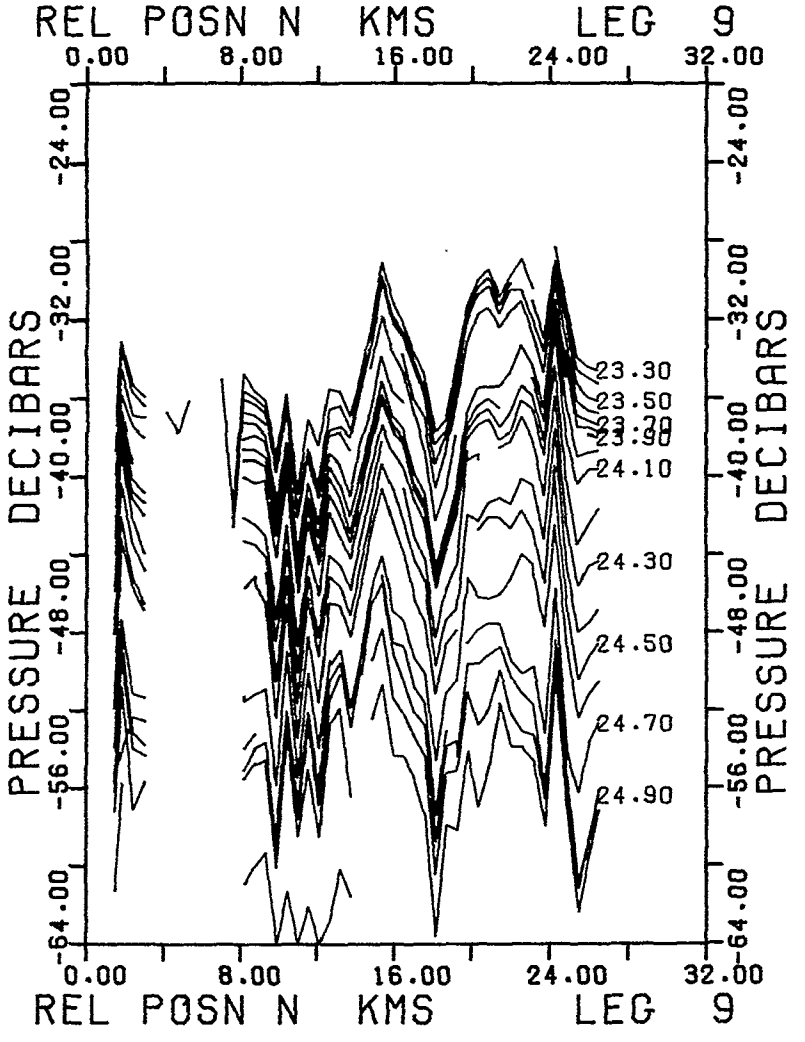


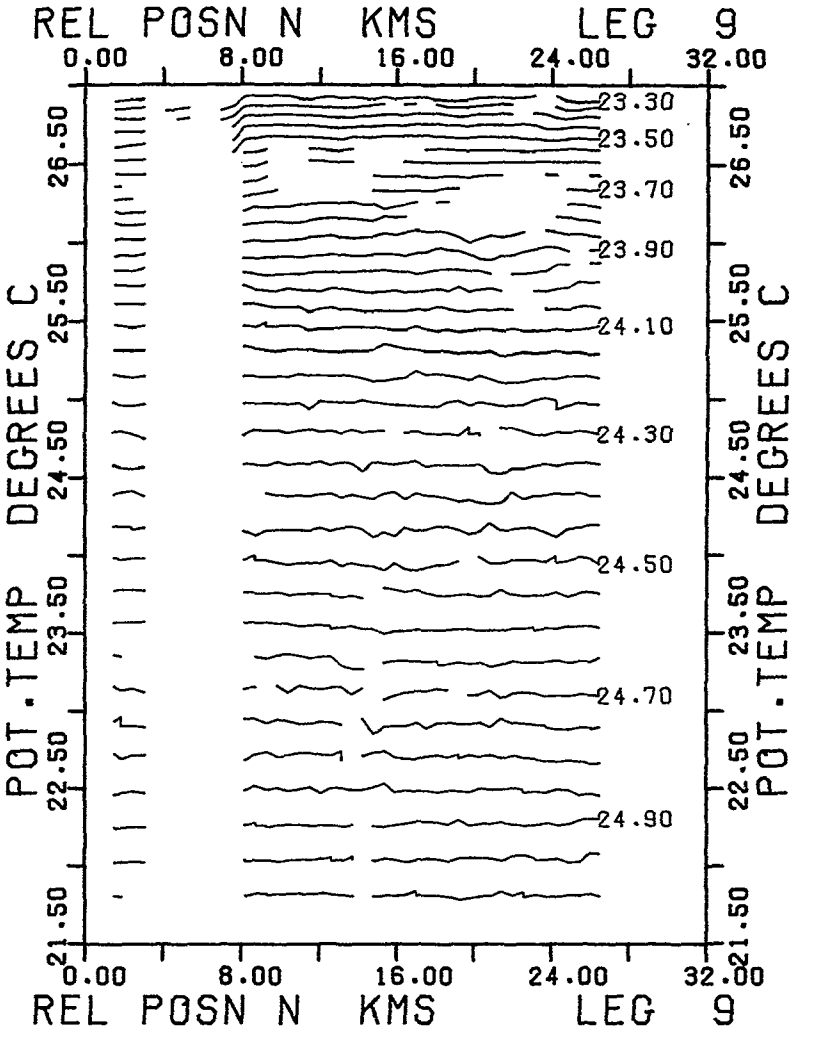
-P and T on Isopycnals-



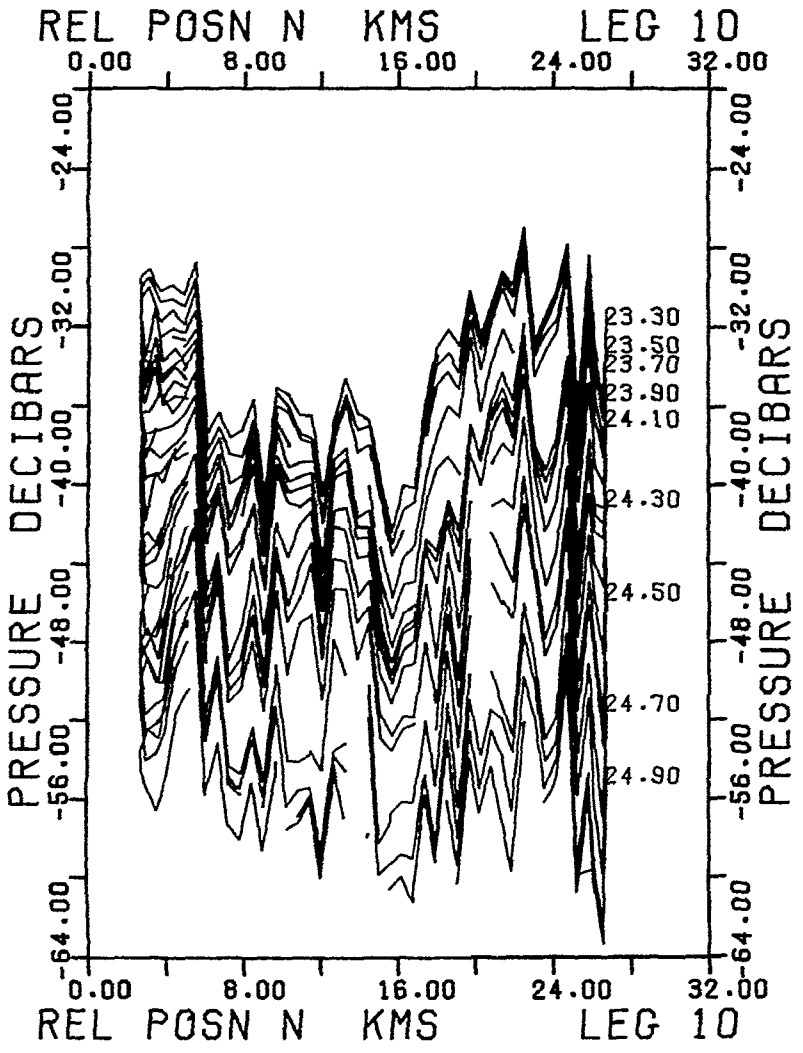


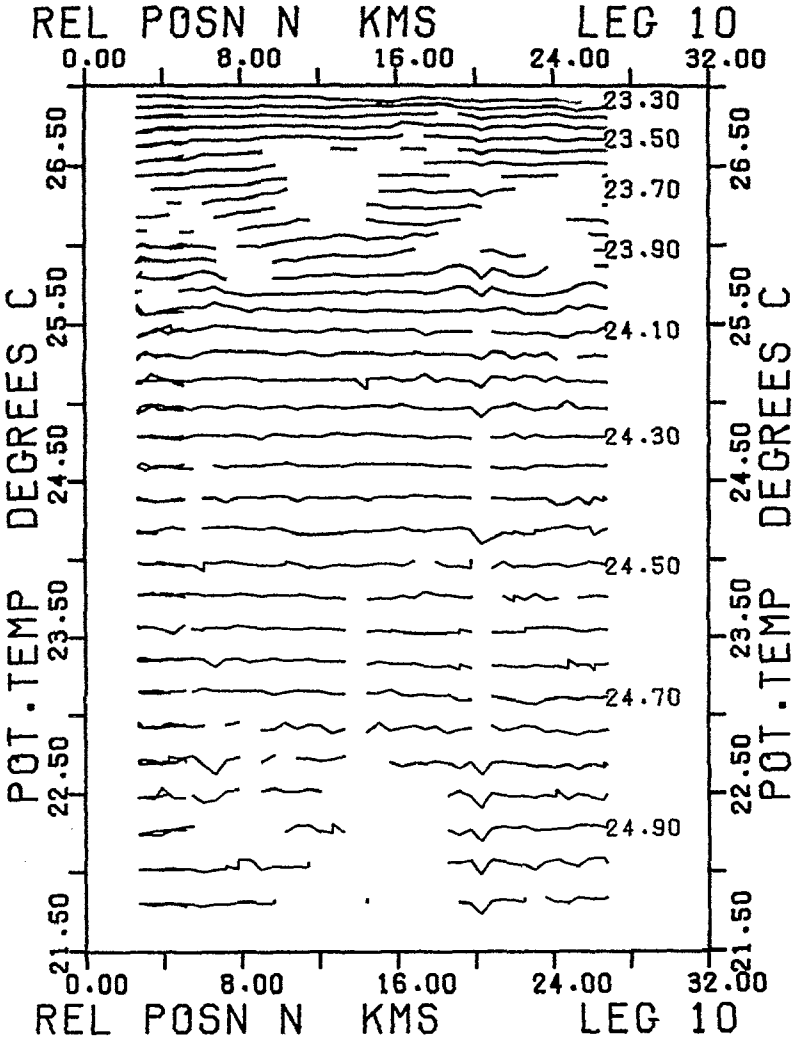
-P and T on Isopycnals-



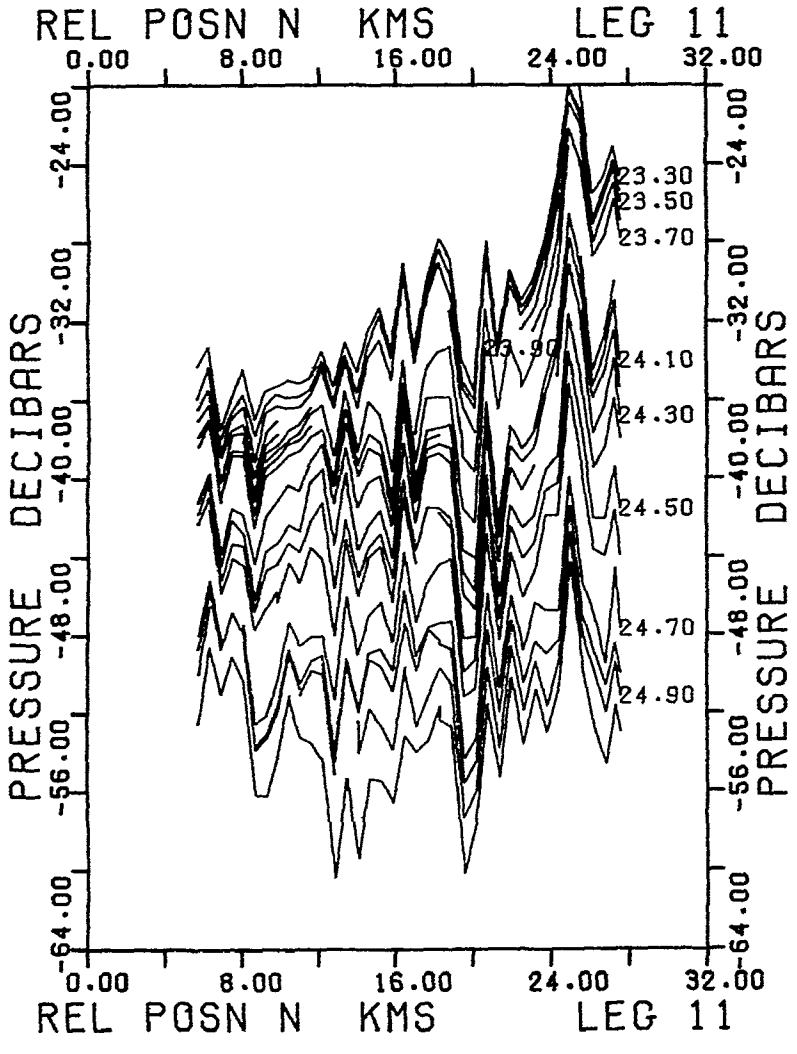


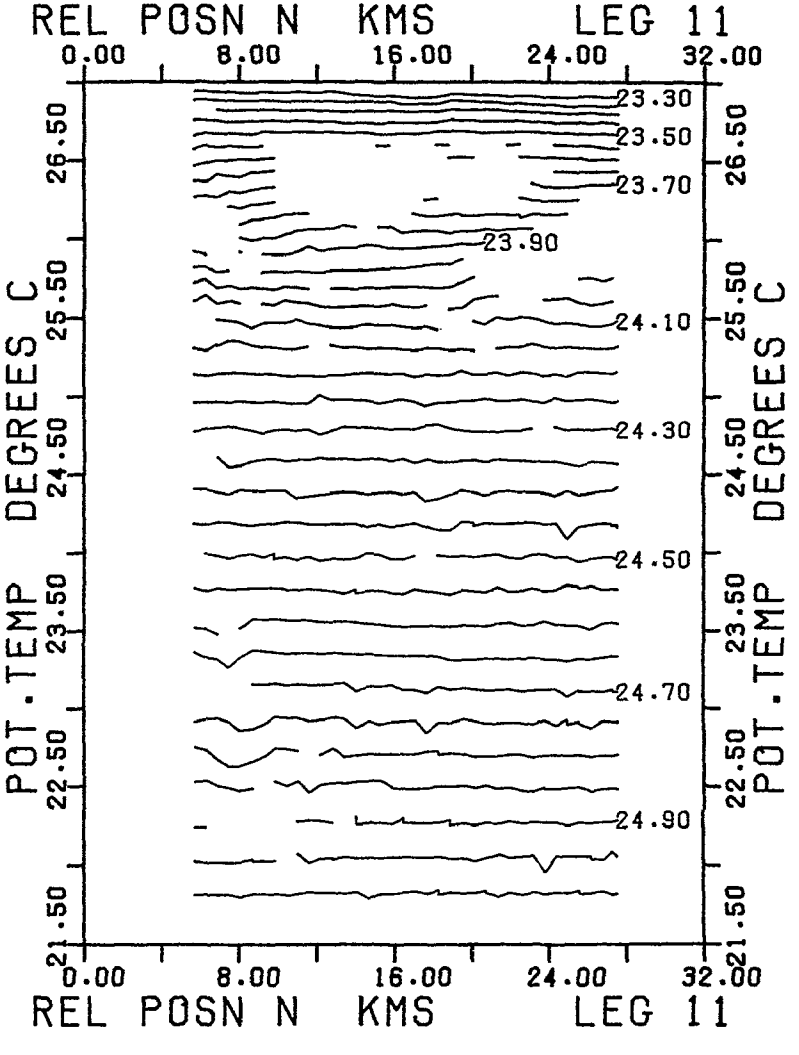
-P and T on Isopycnals-



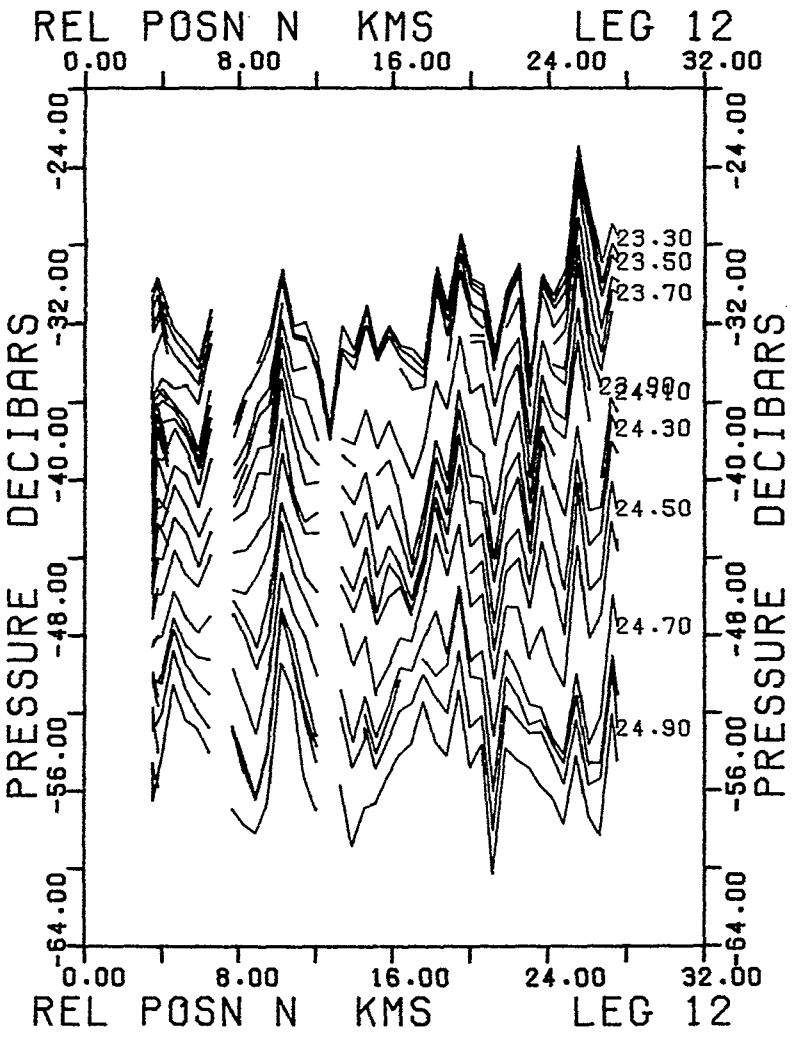


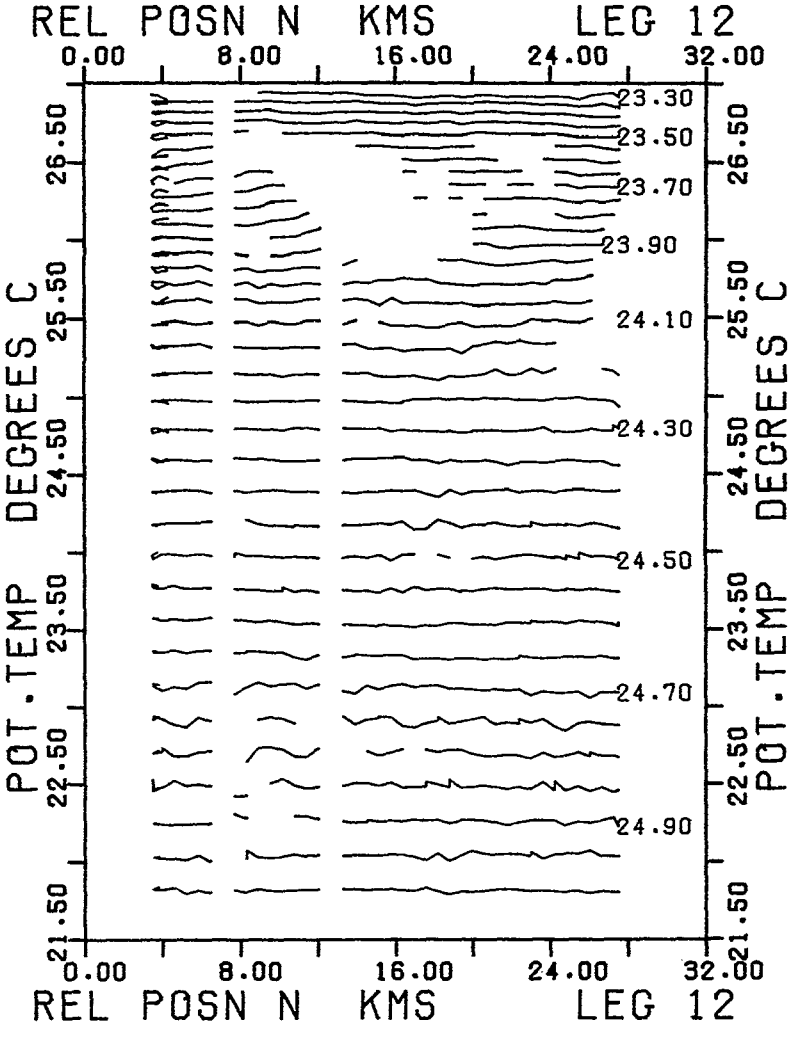
-P and T on Isopycnals-



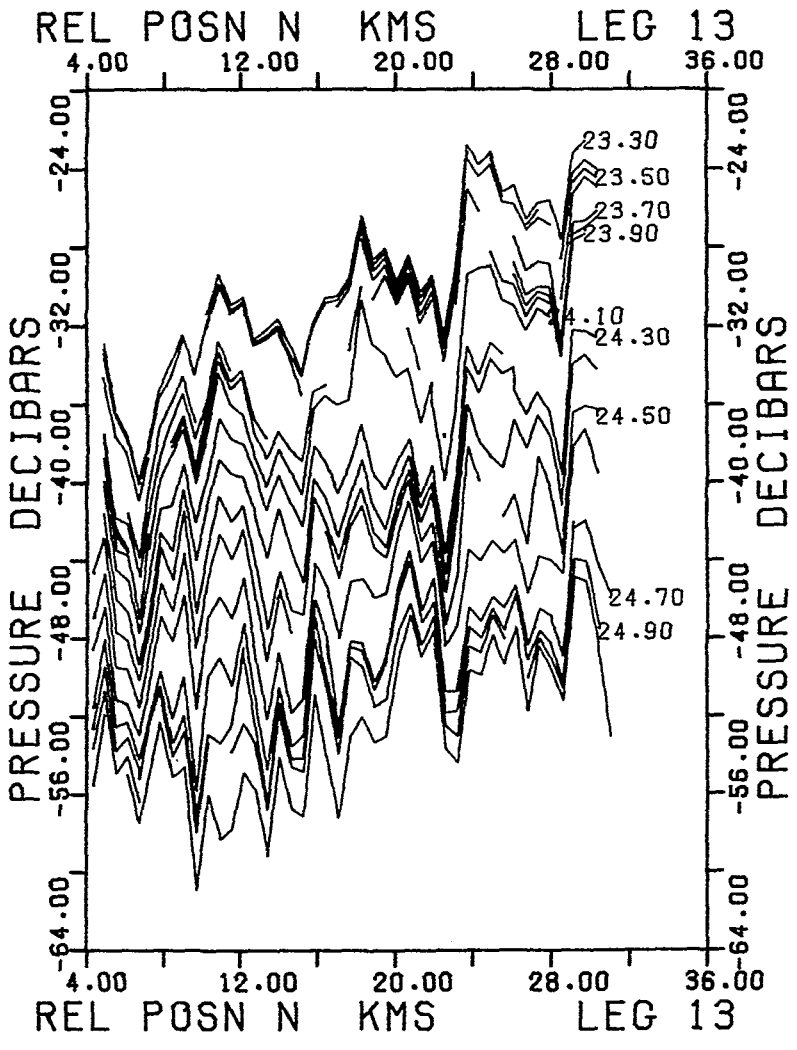


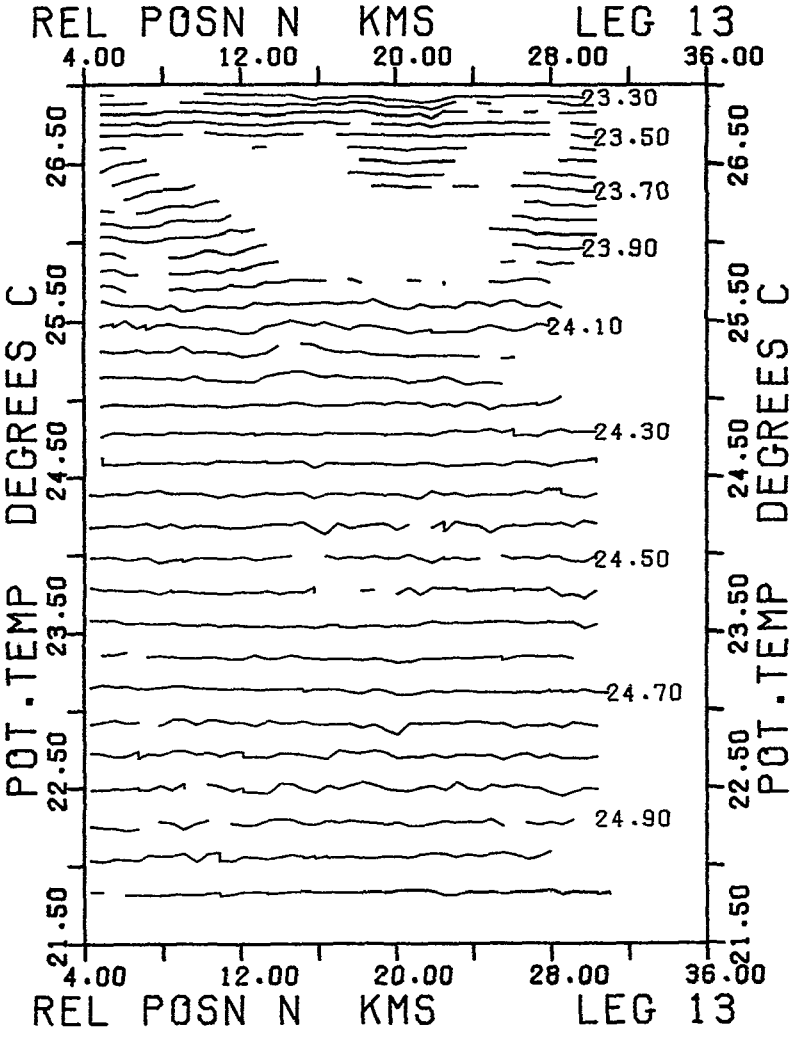
-P and T on Isopycnals-





-P and T on Isopycnals-



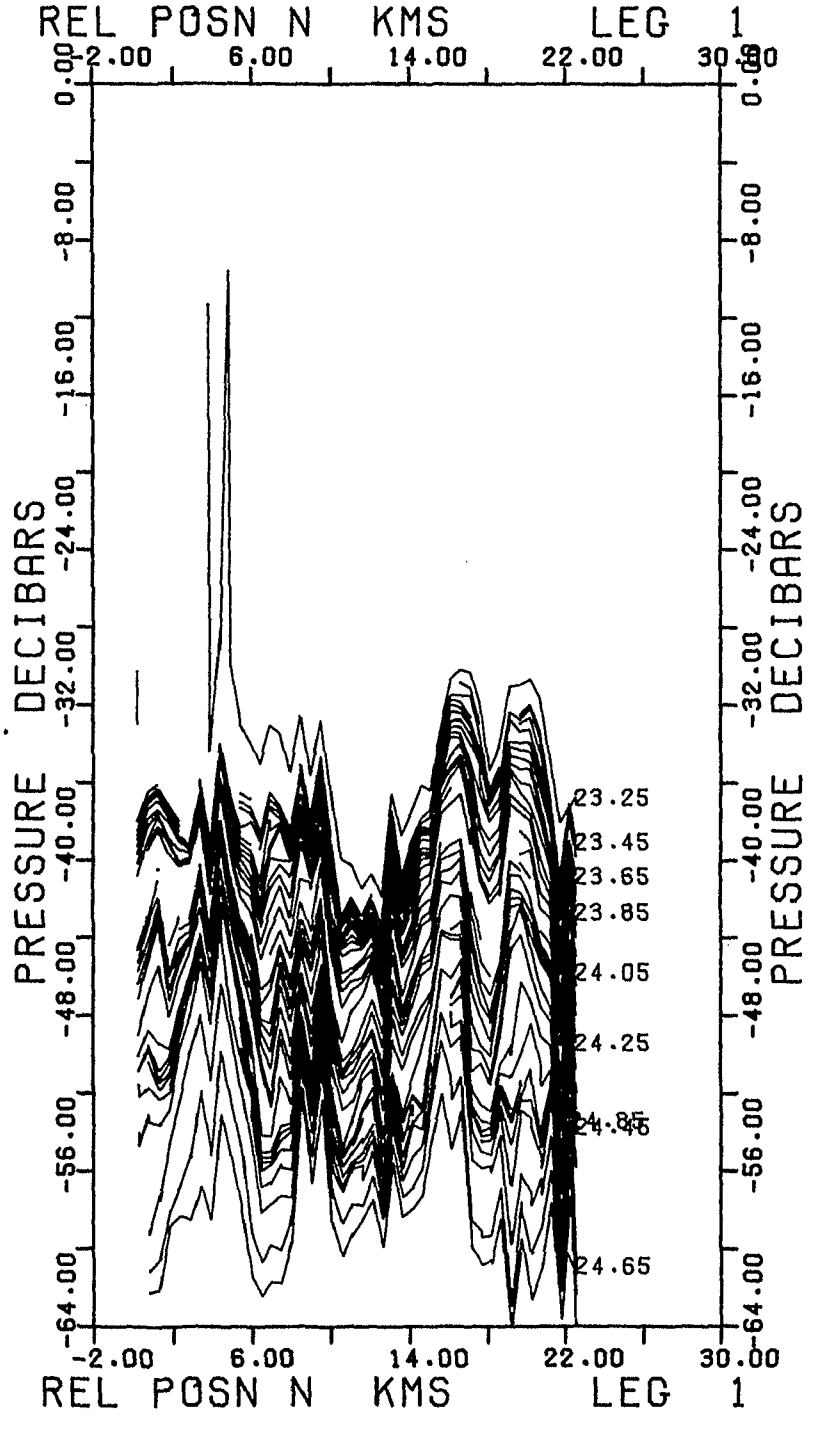


-P and T on Isopycnals-

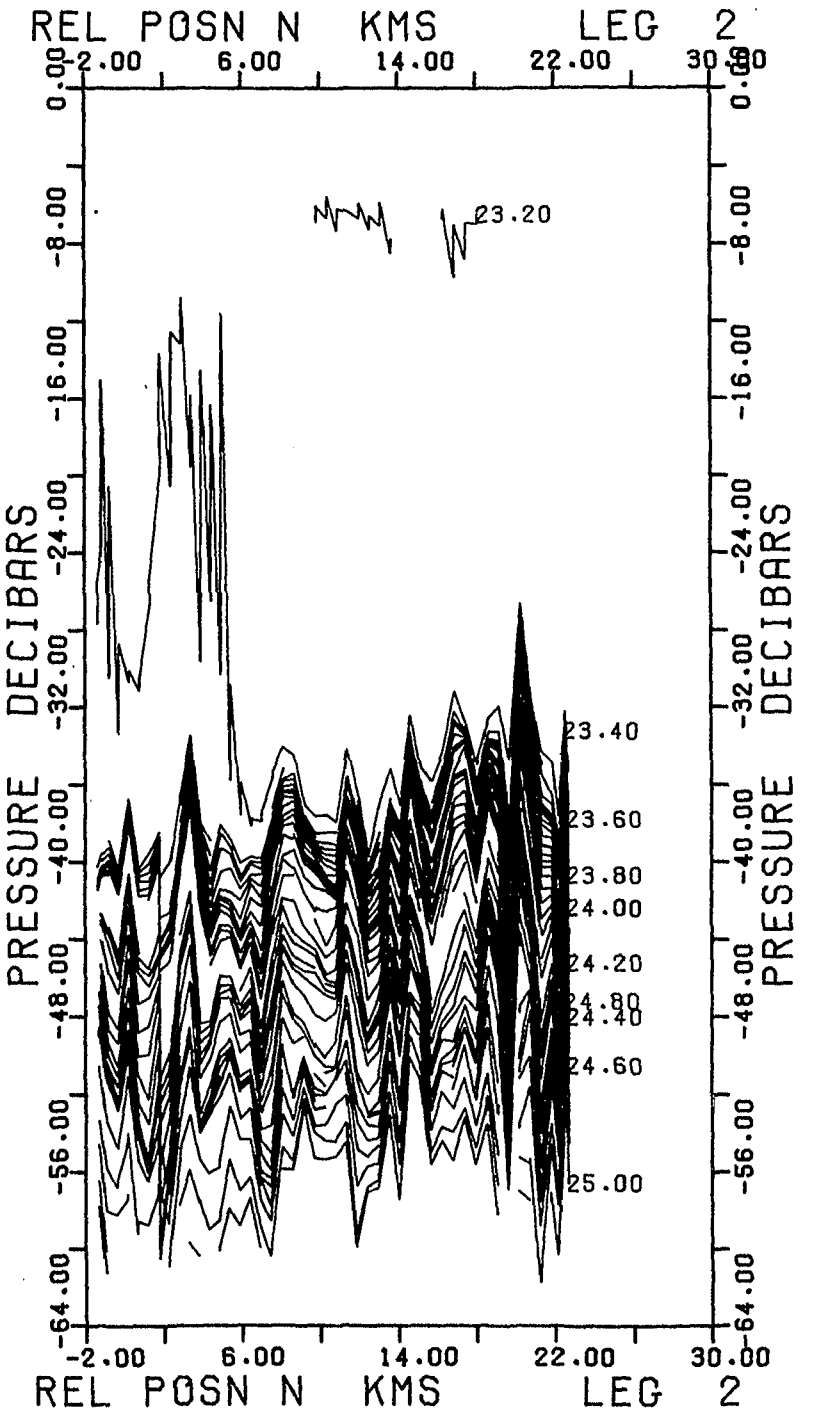
2. Pressure on surfaces of constant σ_t in the range

   σ_t = 23.00 - 25.00.

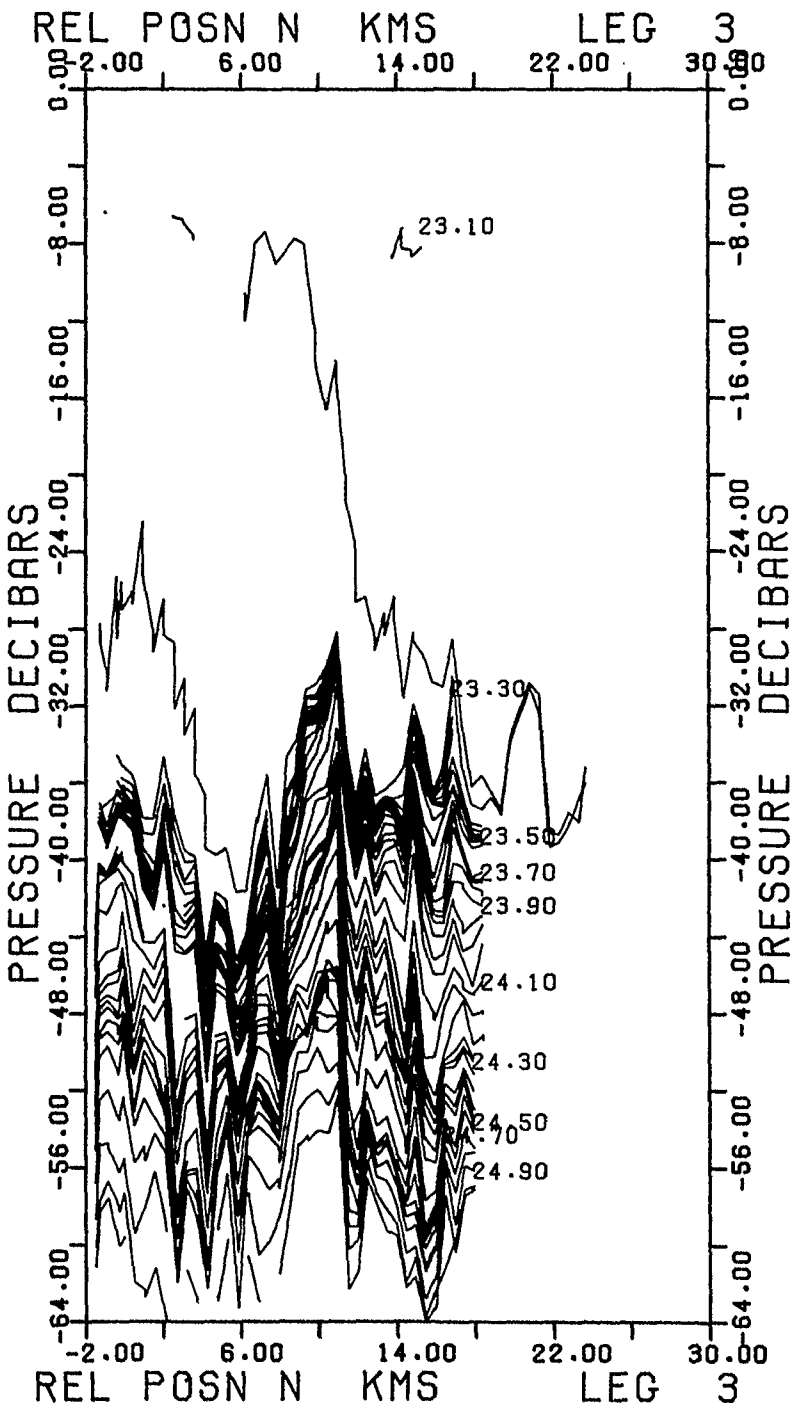
   Contour interval 0.05 σ_t



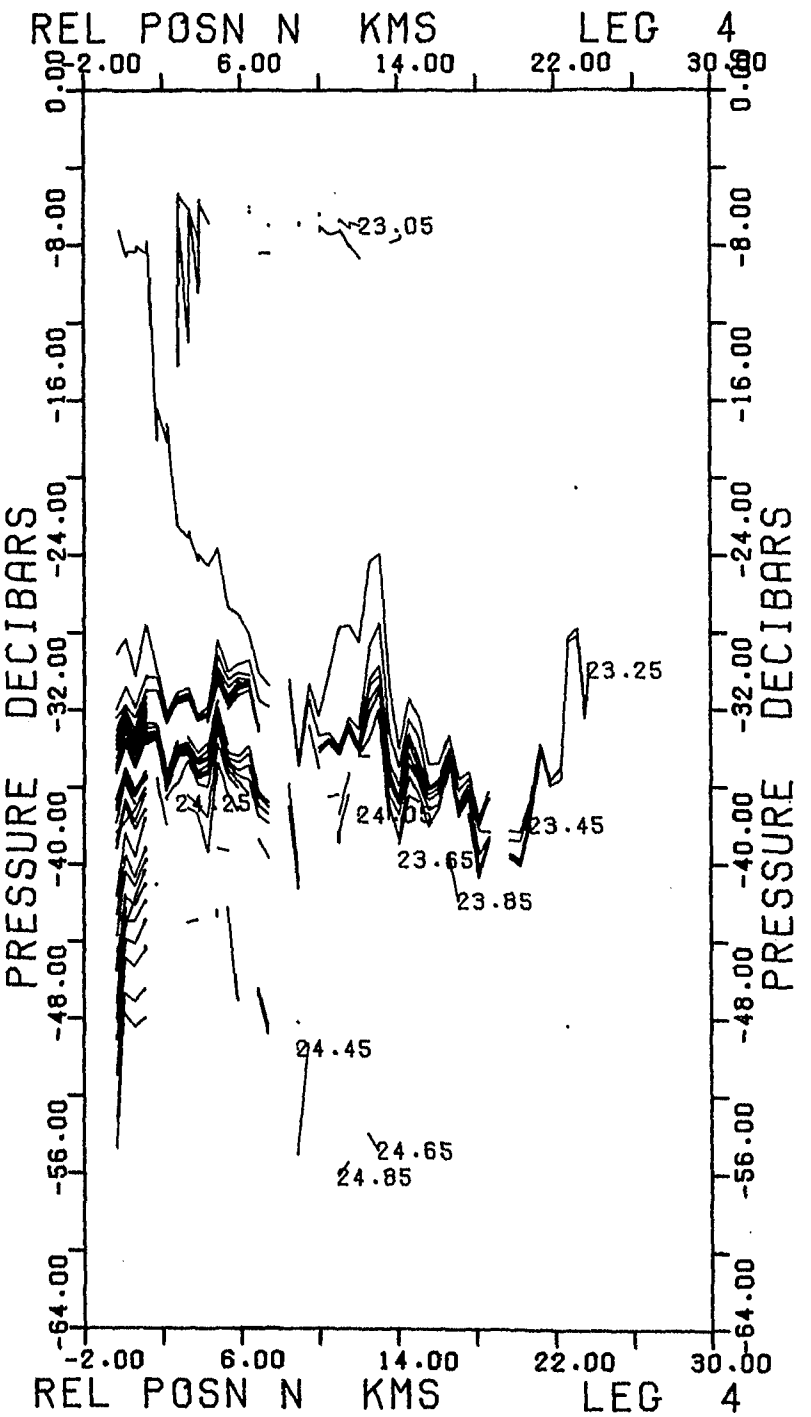
-P on Isopycnals (Ø-64 dbar)-



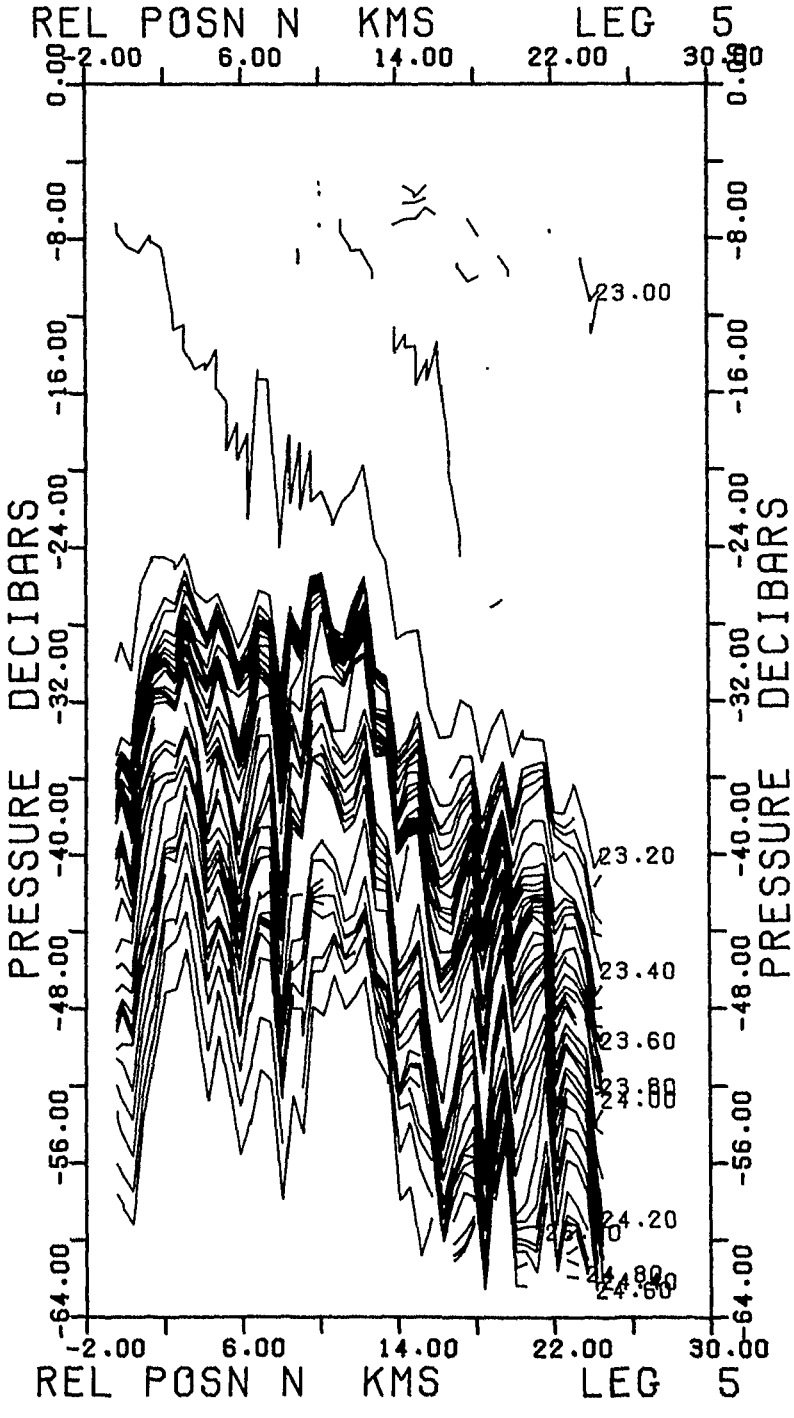
-P on Isopycnals (Ø-64 dbar)-



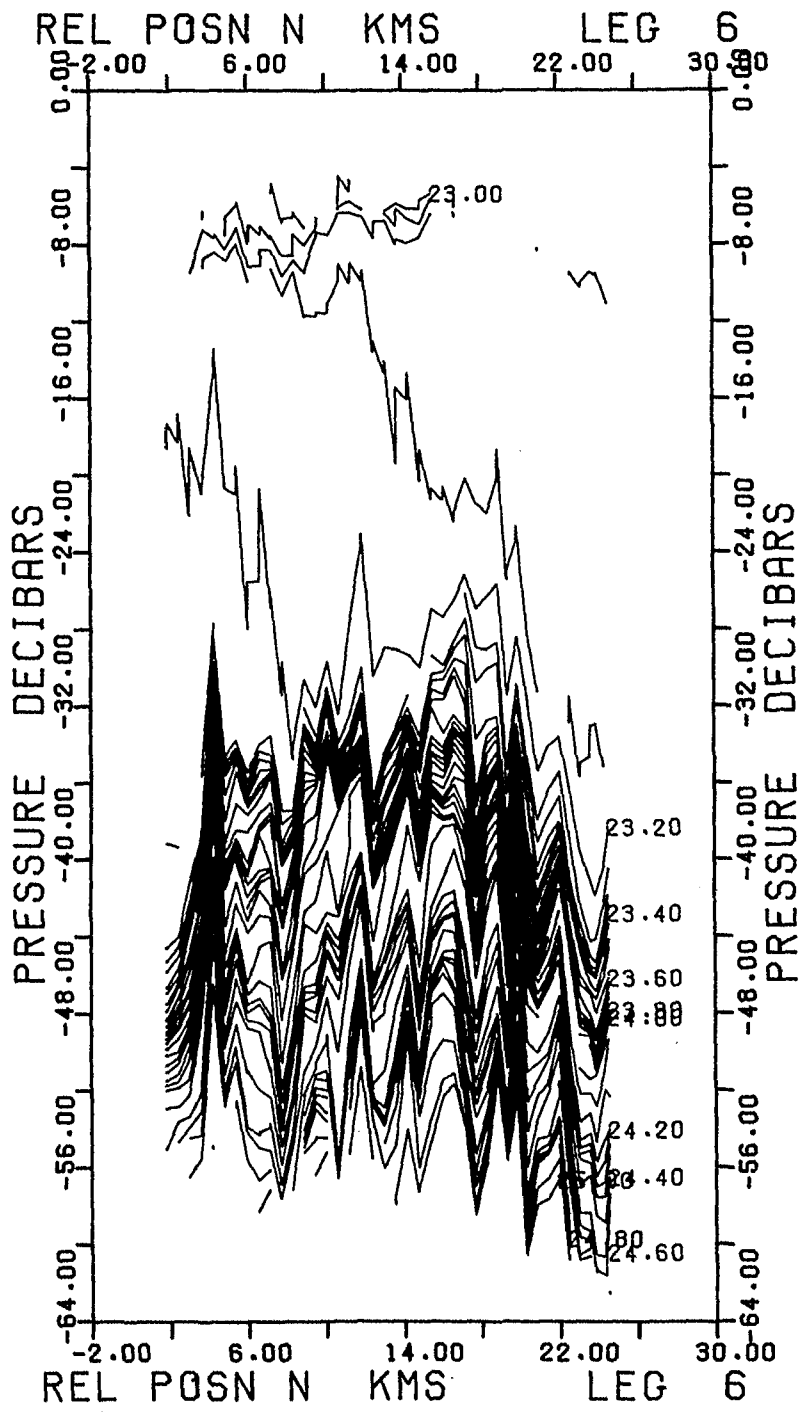
-P on Isopycnals (Ø-64 dbar)-



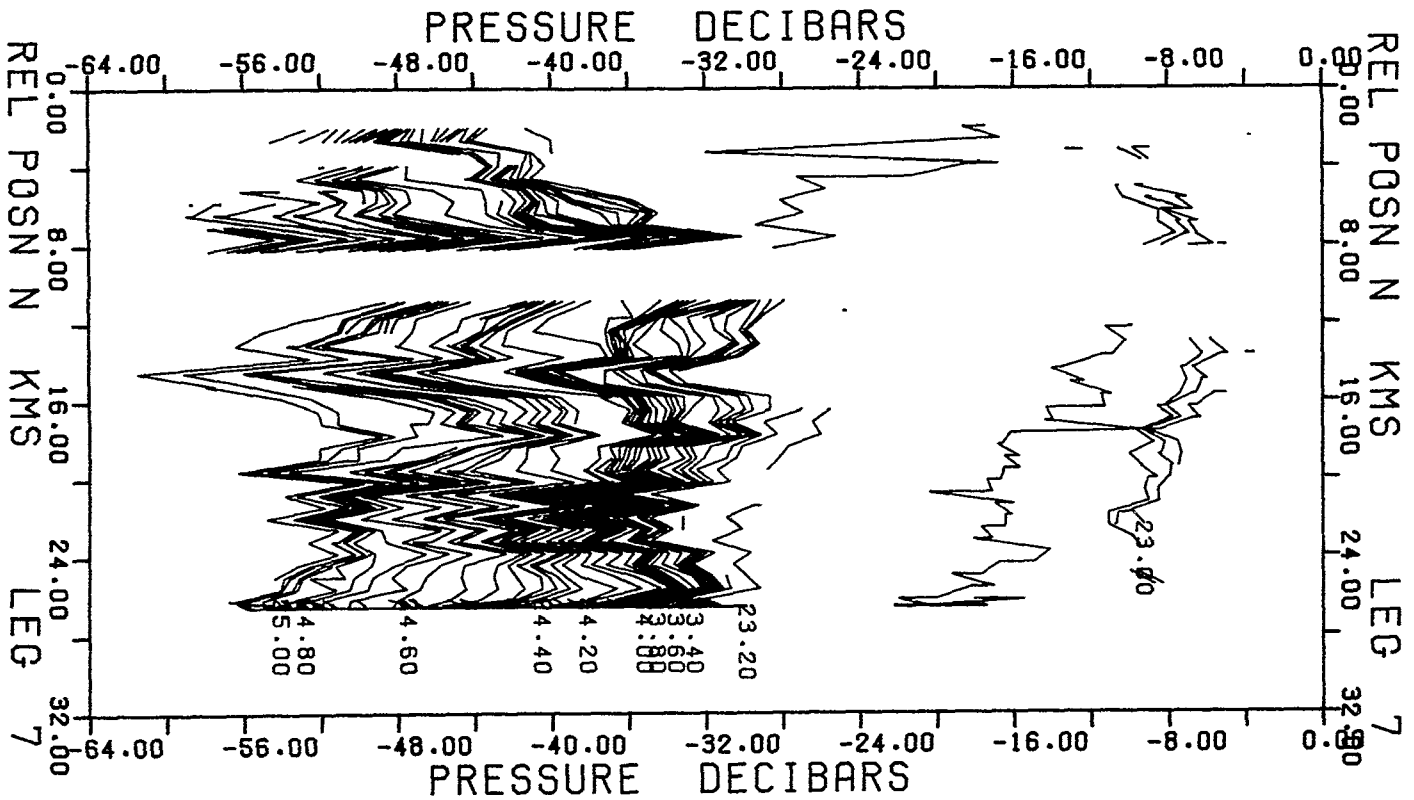
p on Isopycnals (0-64 dbar) -



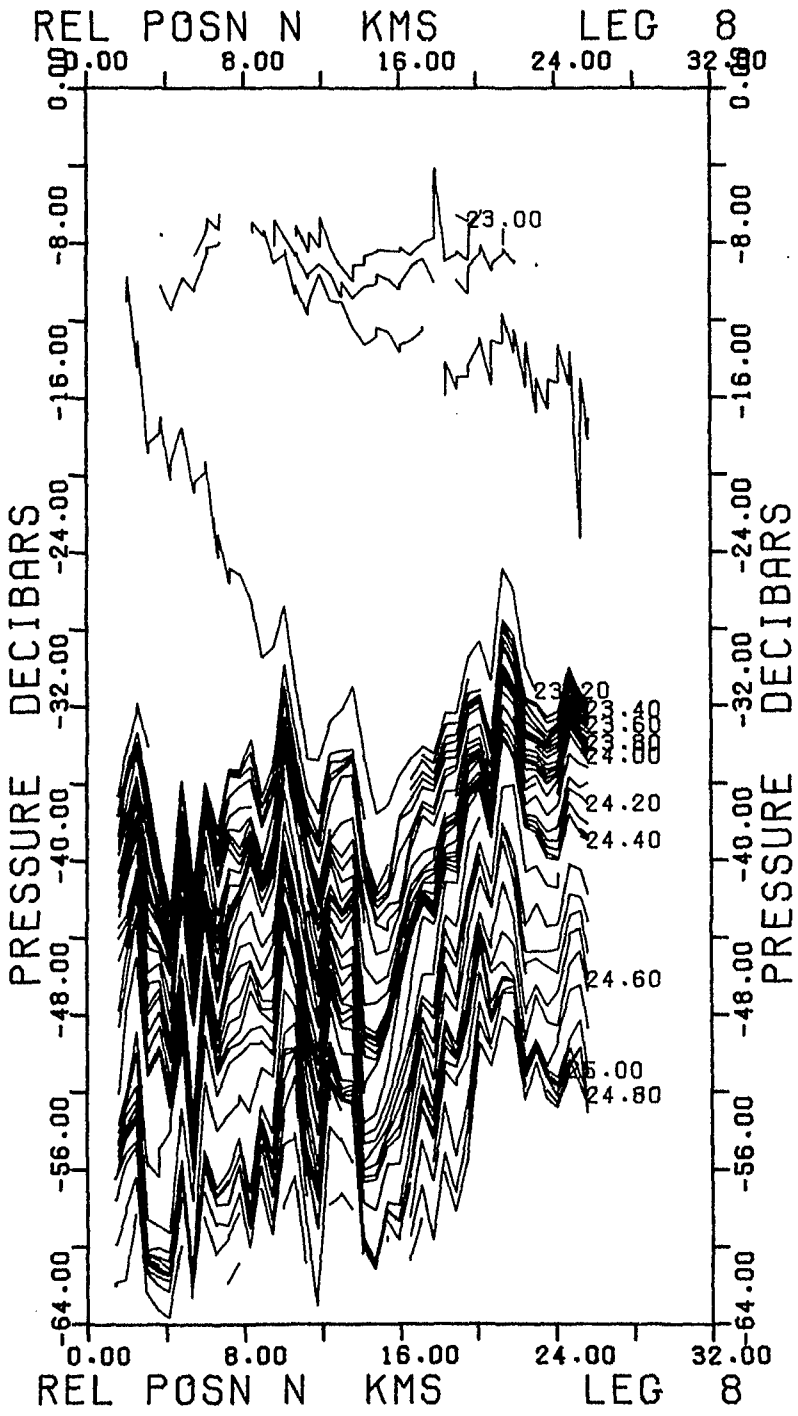
-P on Isopycnals (Ø-64 dbar)-



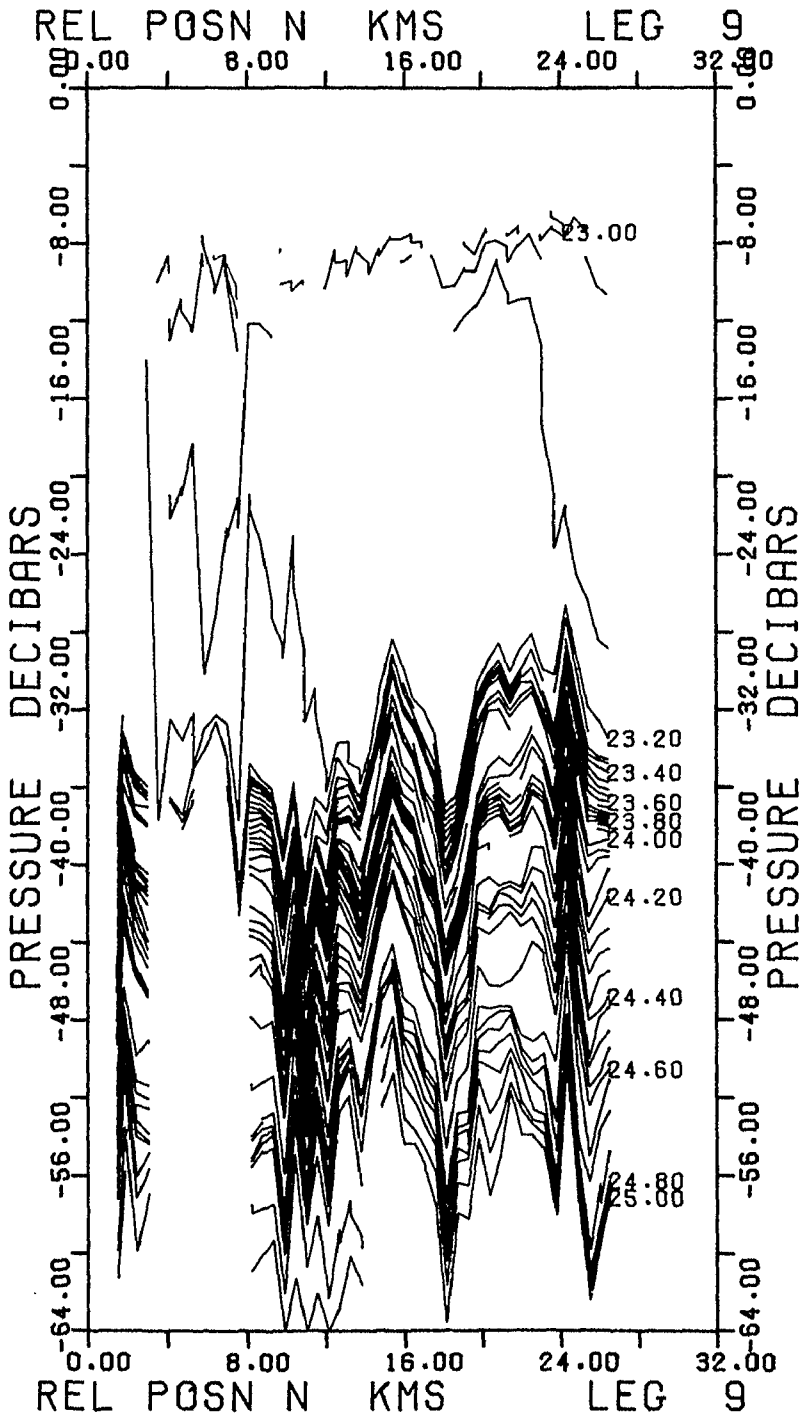
-p on Isopycnals (0-64 dbar) -



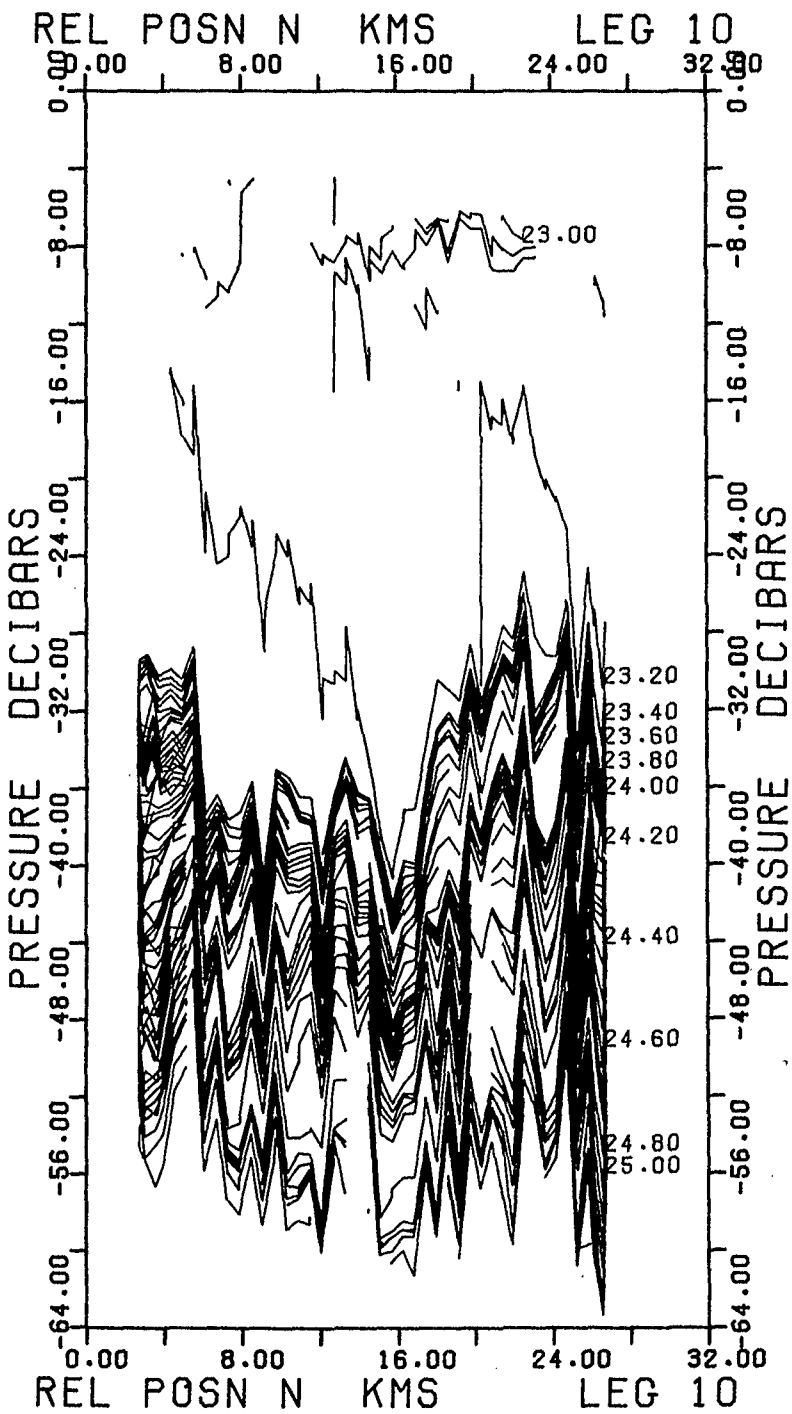
-P on Isopycnals (Ø-64 dbar)-



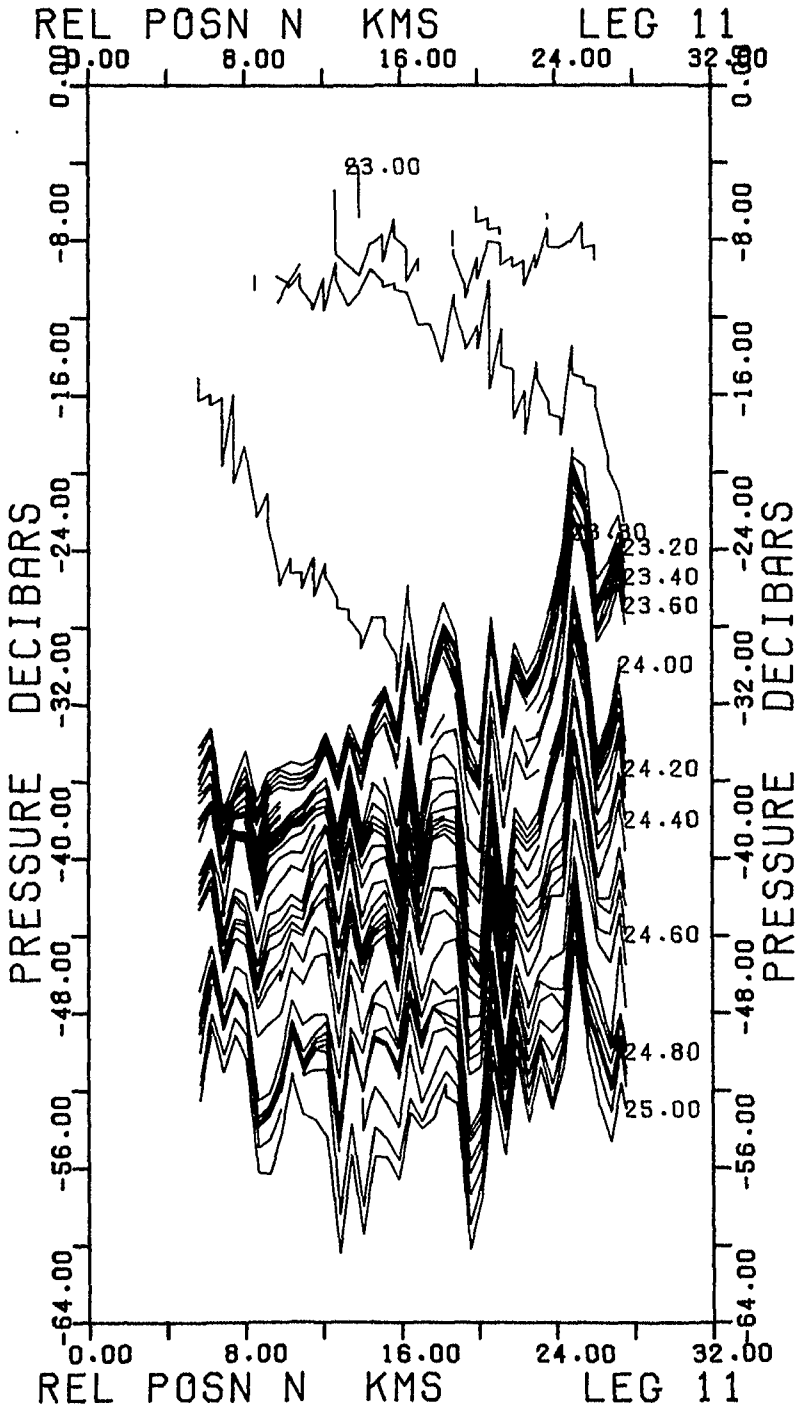
-P on Isopycnals (Ø-64 dbar) -



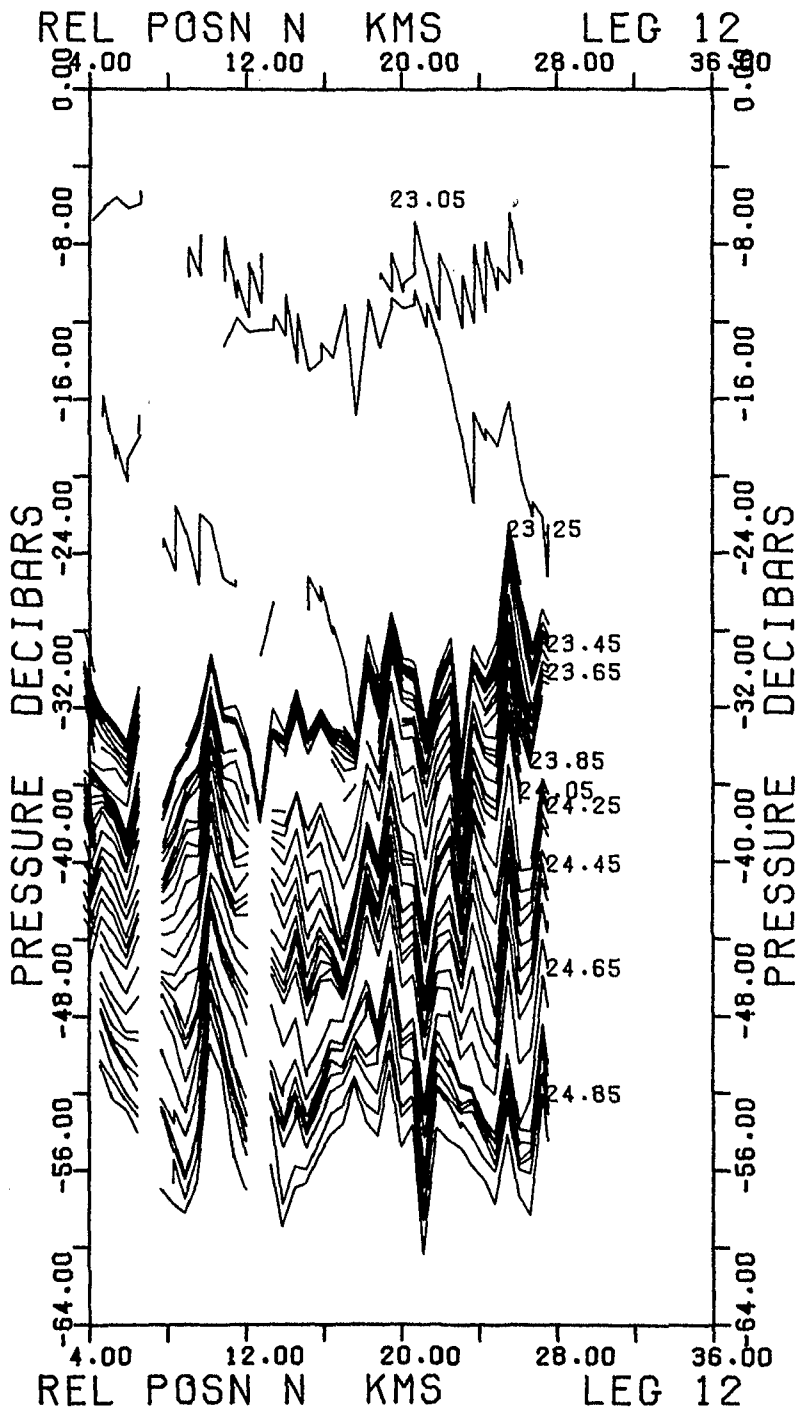
- ρ on Isopycnals (0-64 dbar) -



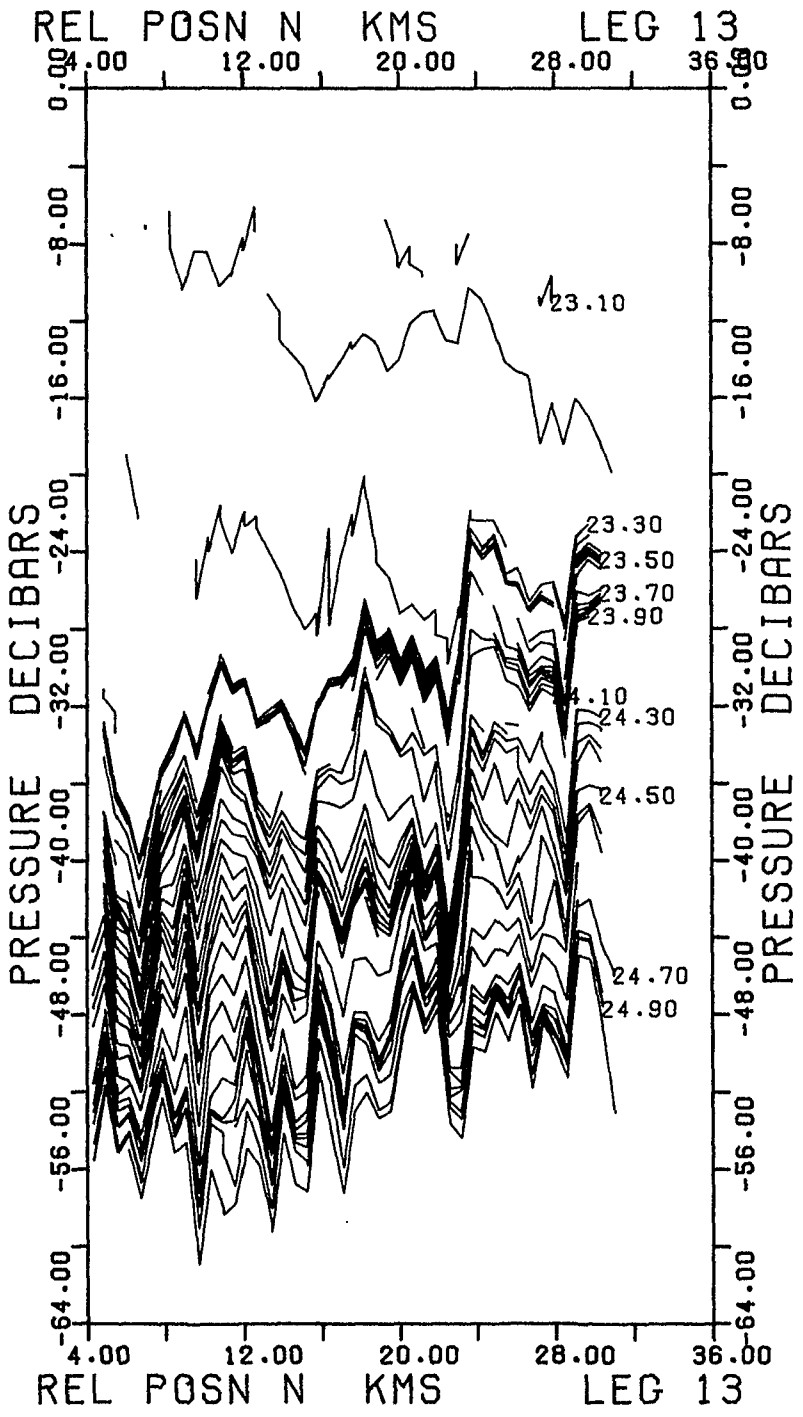
-p on Isopycnals (0-64 dbar) -



-P on Isopycnals (0-64 dbar) -



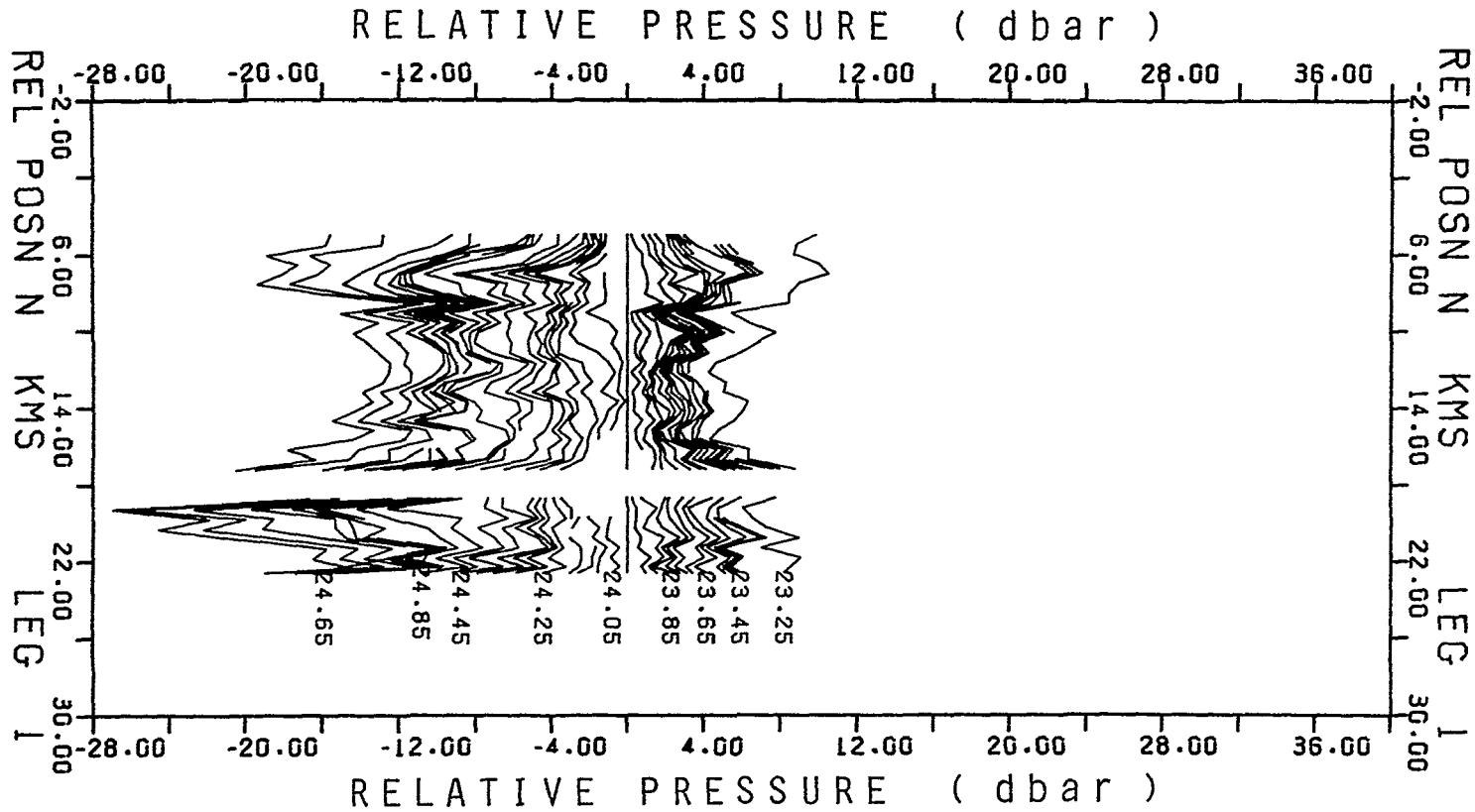
-P on Isopycnals (0-64 dbar)-



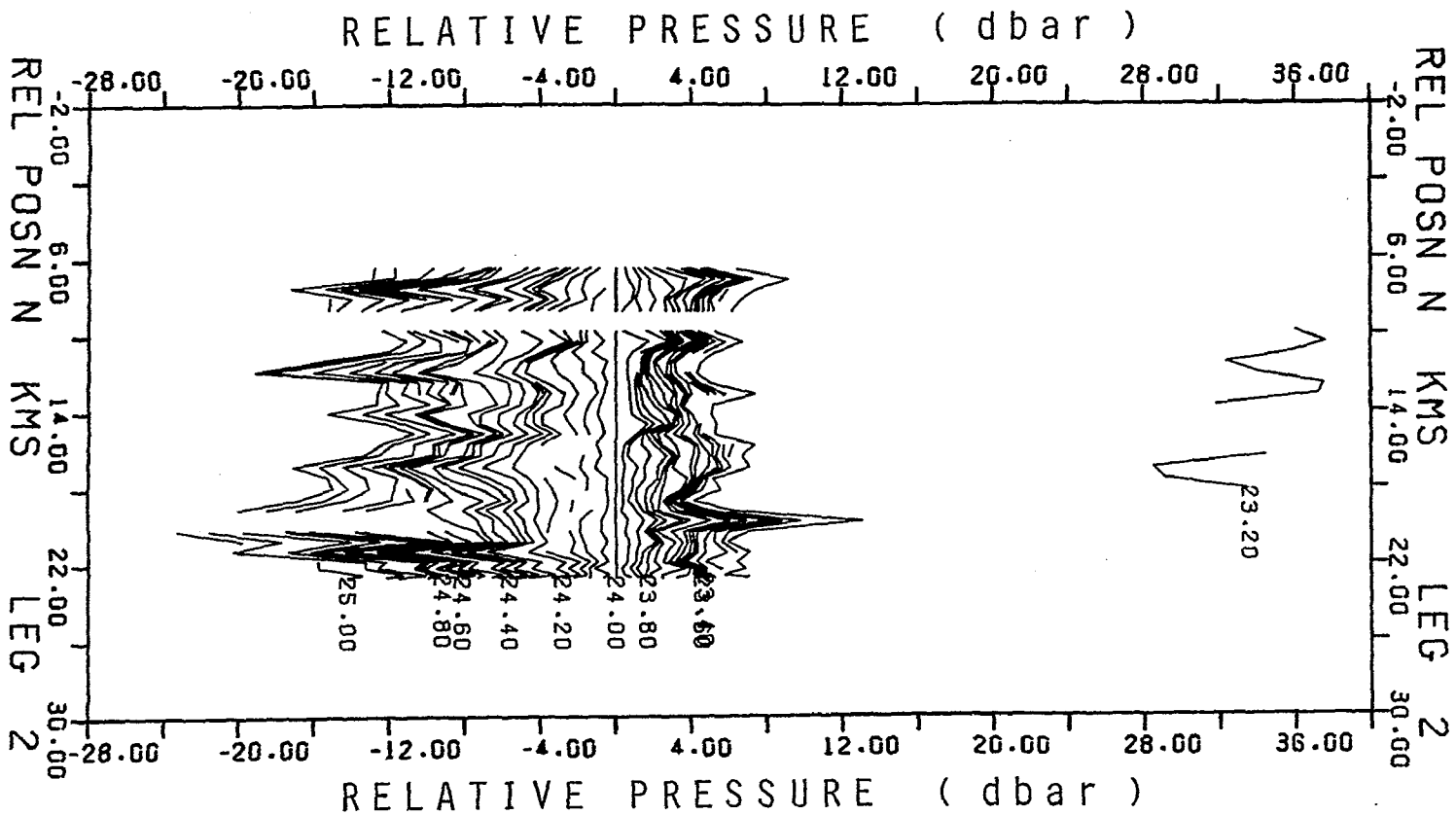
-p on Isopycnals (Ø-64 dbar) -

3. Pressure, relative to the pressure on σ_t = 24.00,
   on surfaces of constant σ_t in the range σ_t = 23.20 - 25.00.

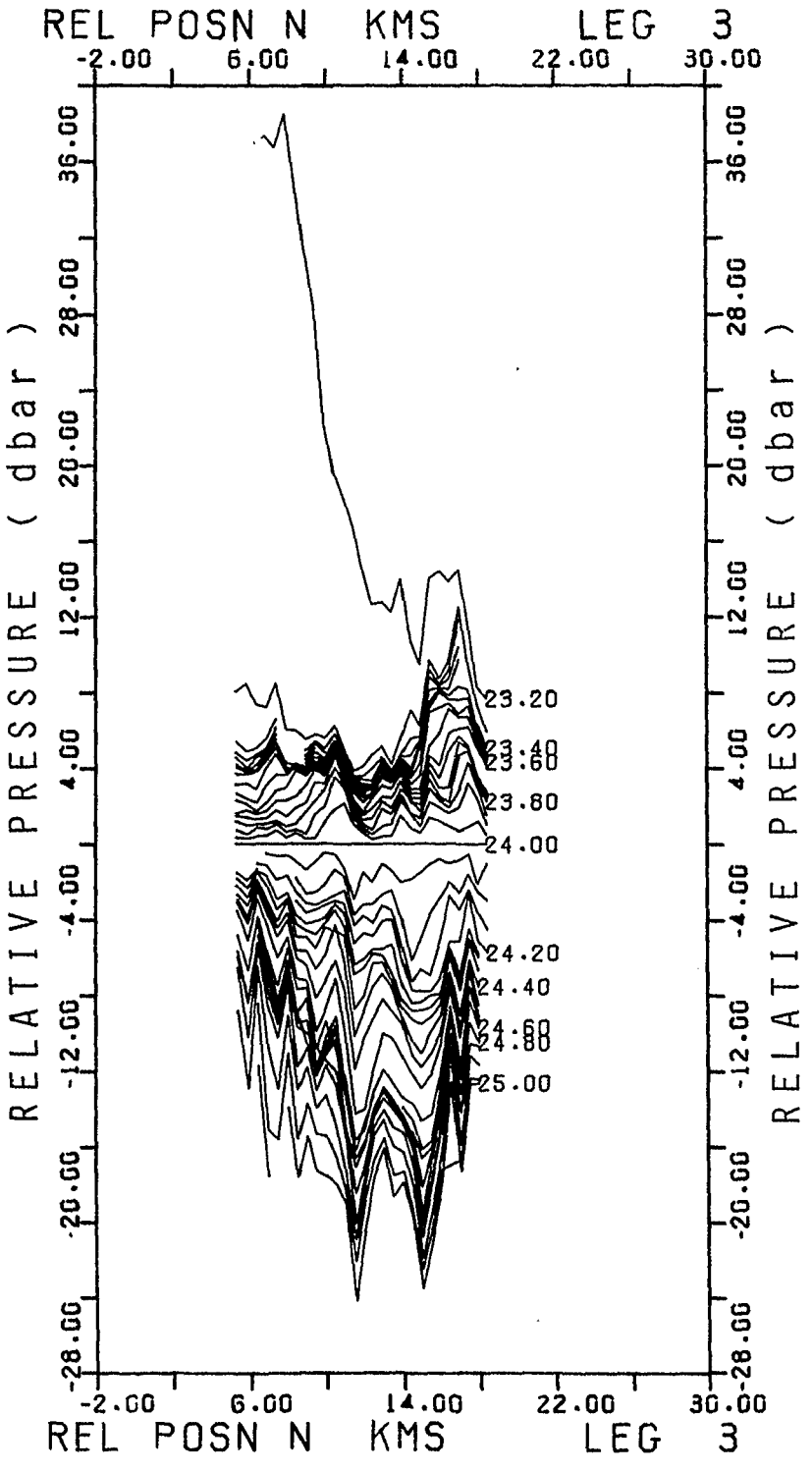
   Contour interval 0.05 σ_t



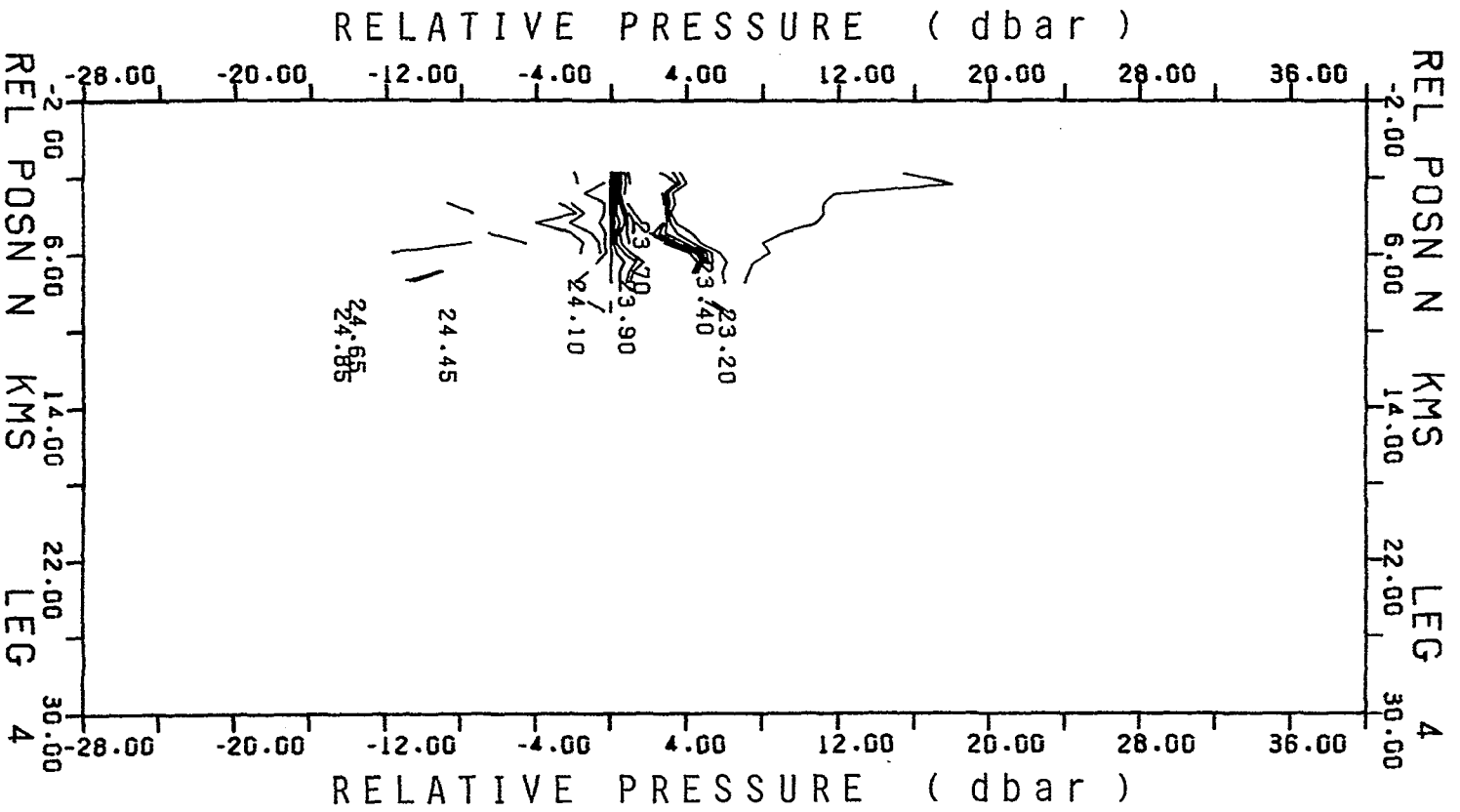
-Relative Pressure on Isopycnals-



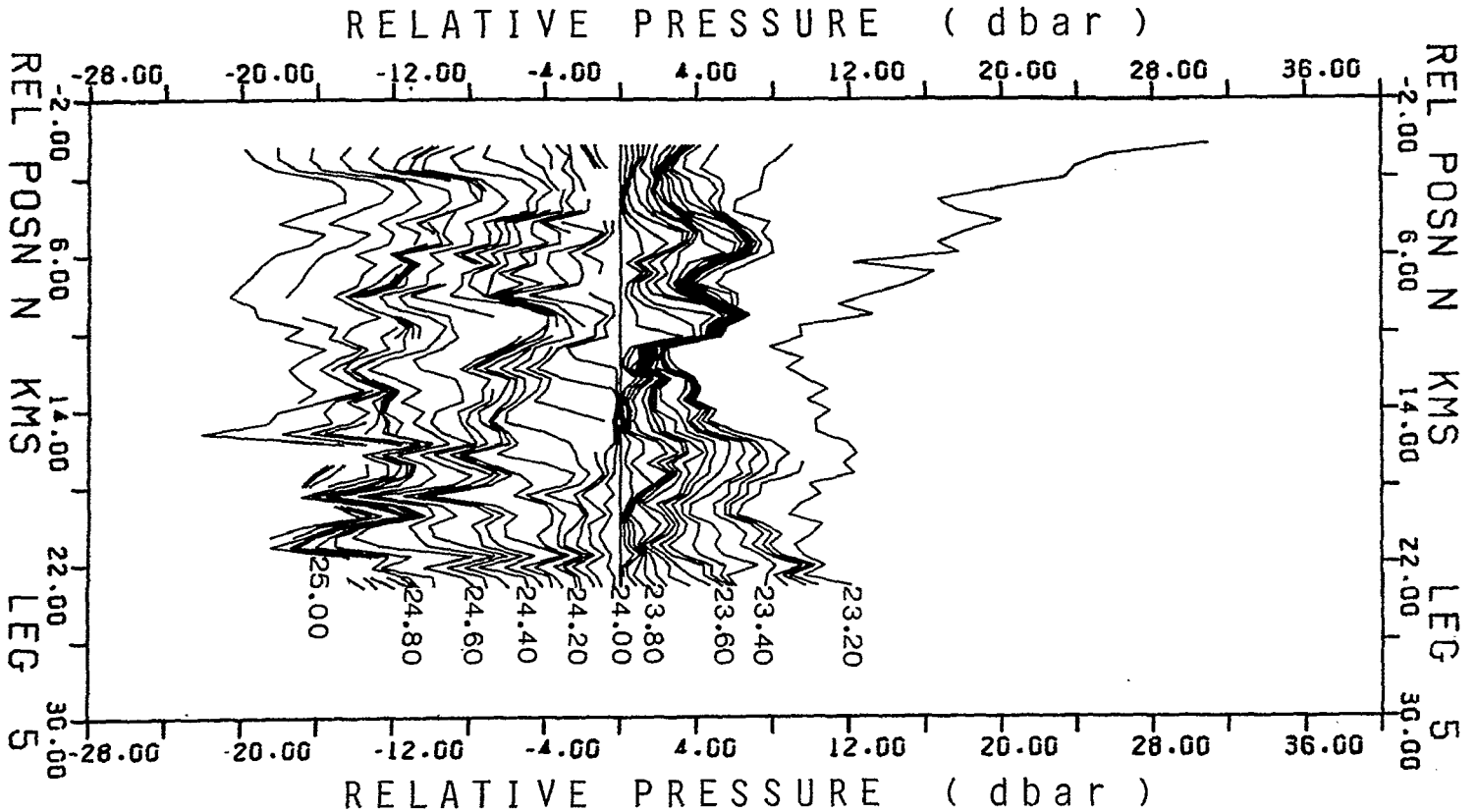
-Relative Pressure on Isopycnals-



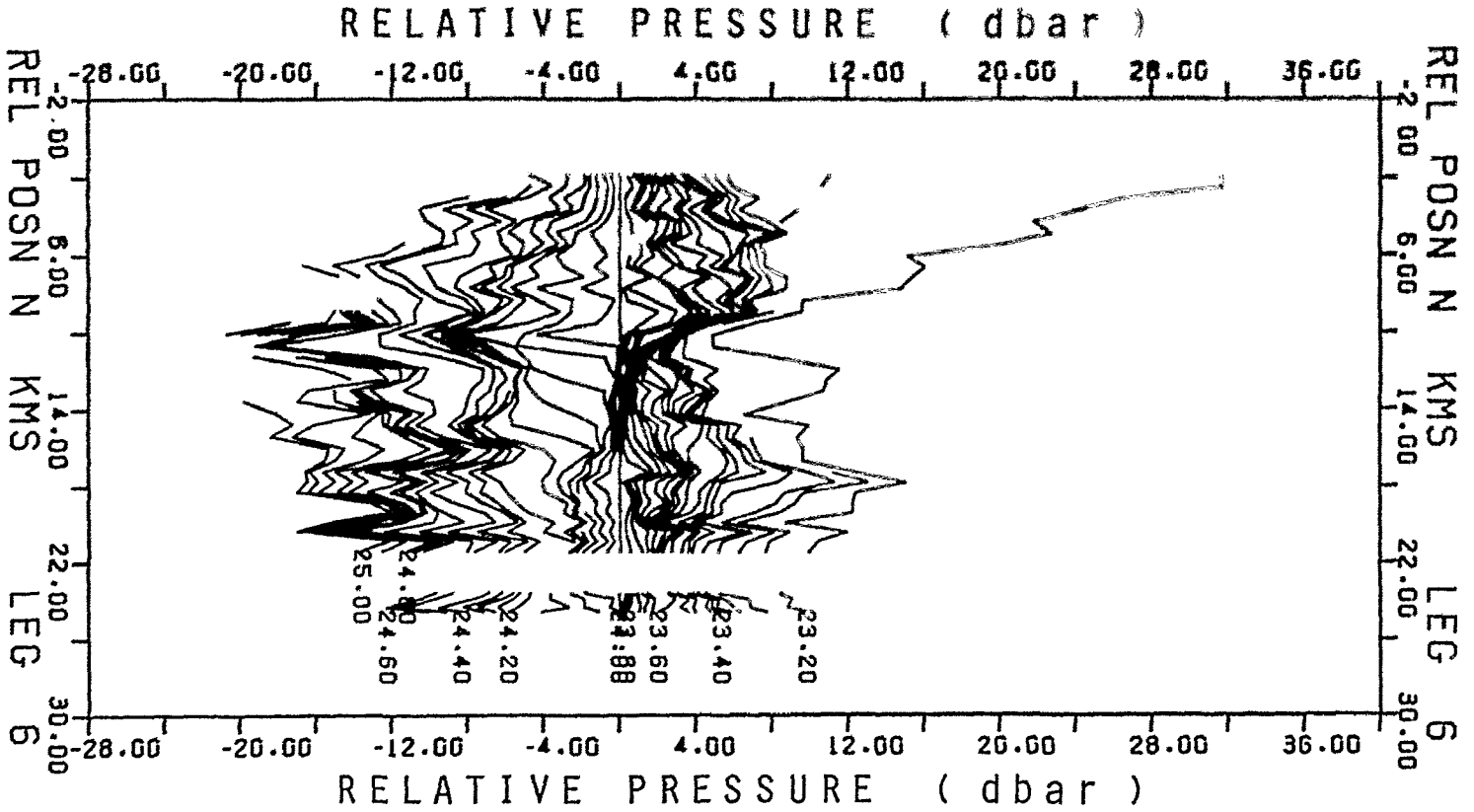
-Relative Pressure on Isopycnals-



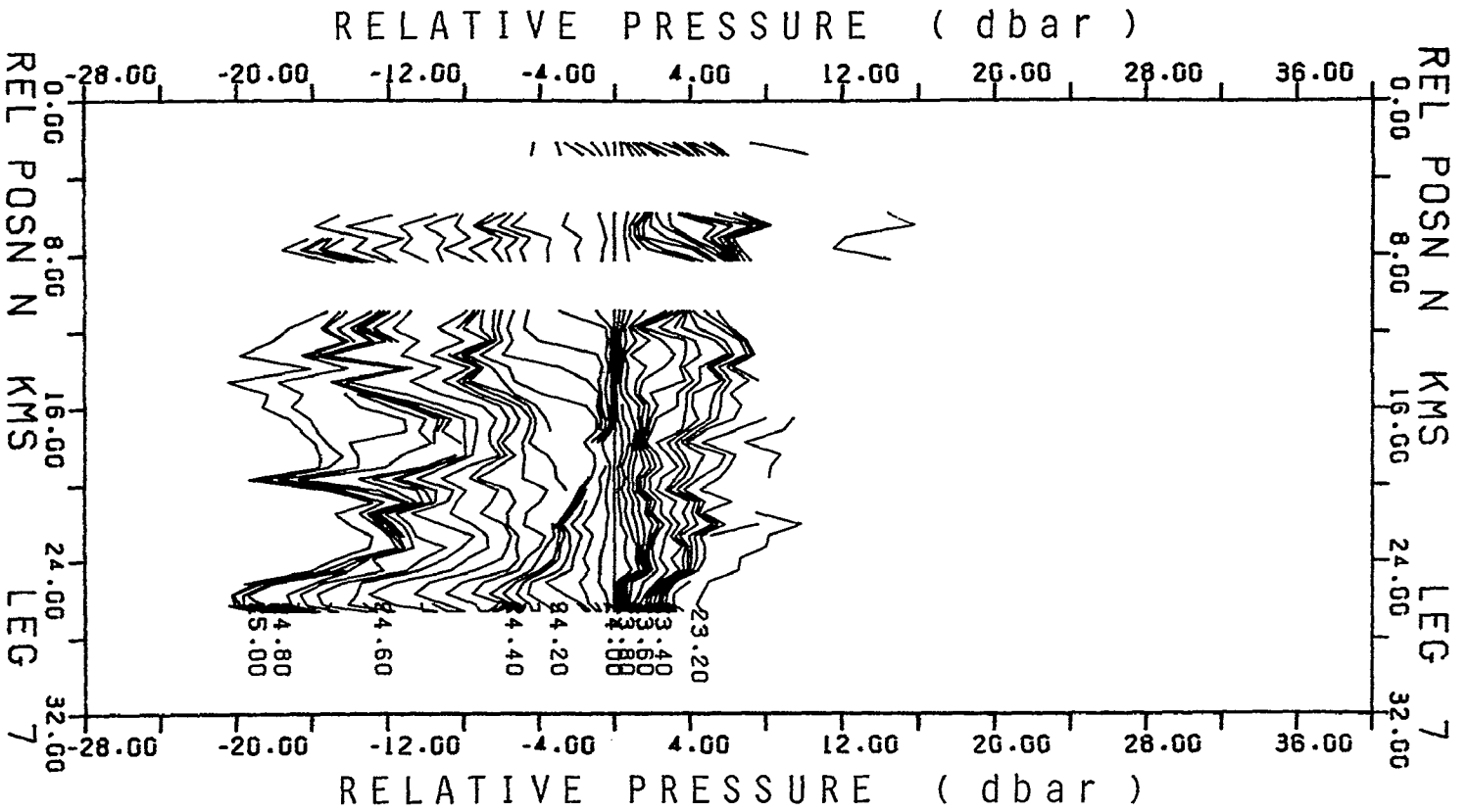
-Relative Pressure on Isopycnals-



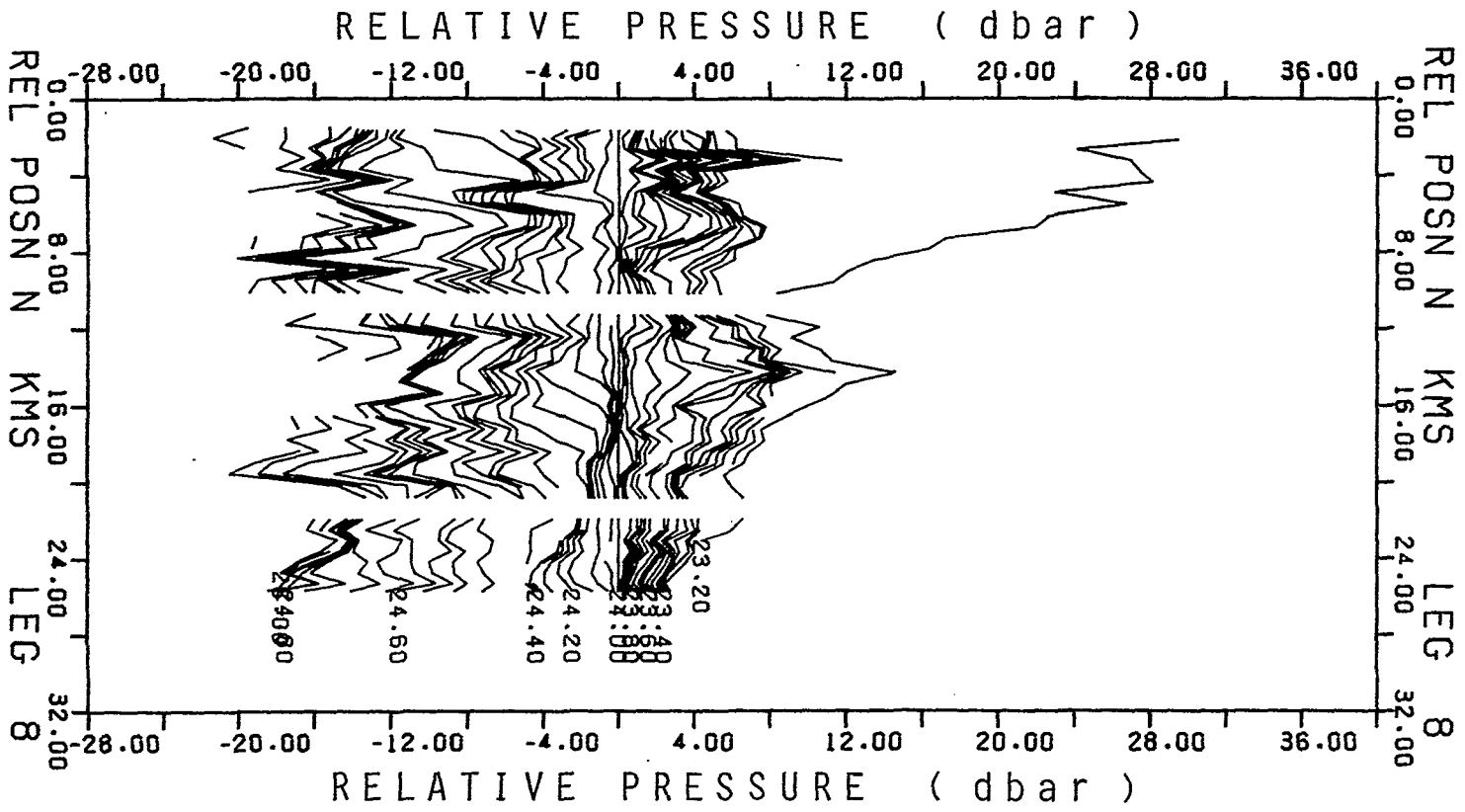
-Relative Pressure on Isopycnals-



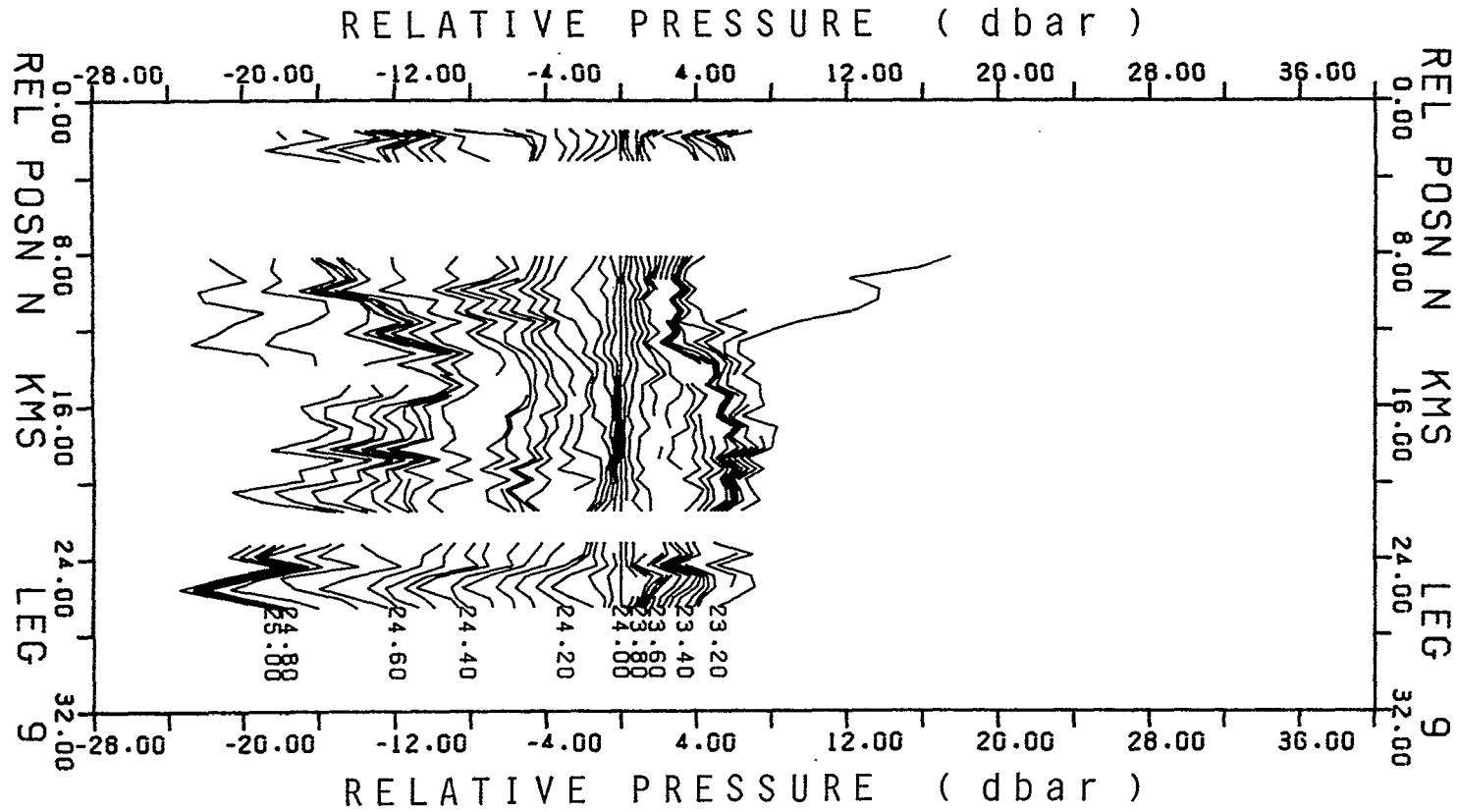
-Relative Pressure on Isopycnals-



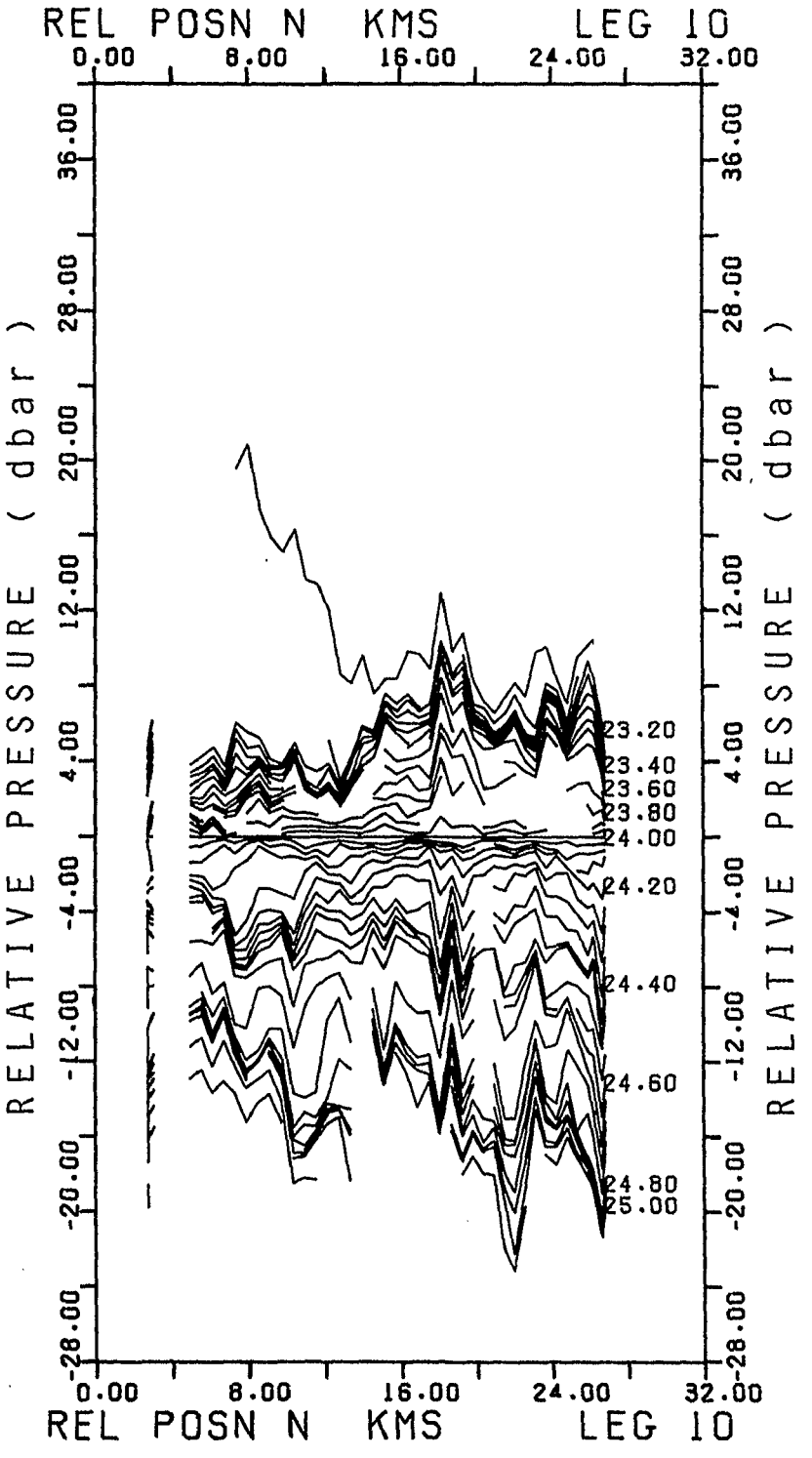
-Relative Pressure on Isopycnals-



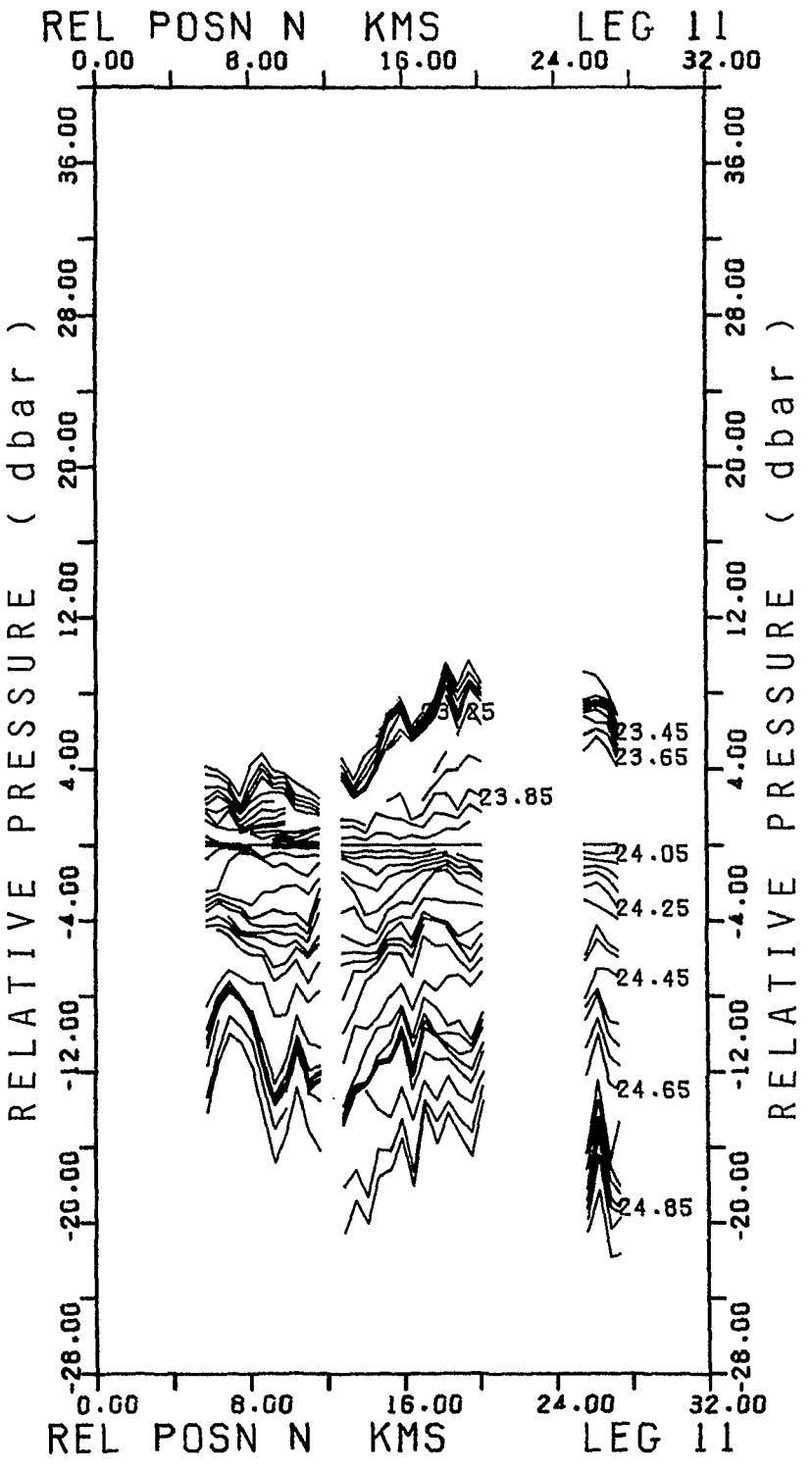
-Relative Pressure on Isopycnals-



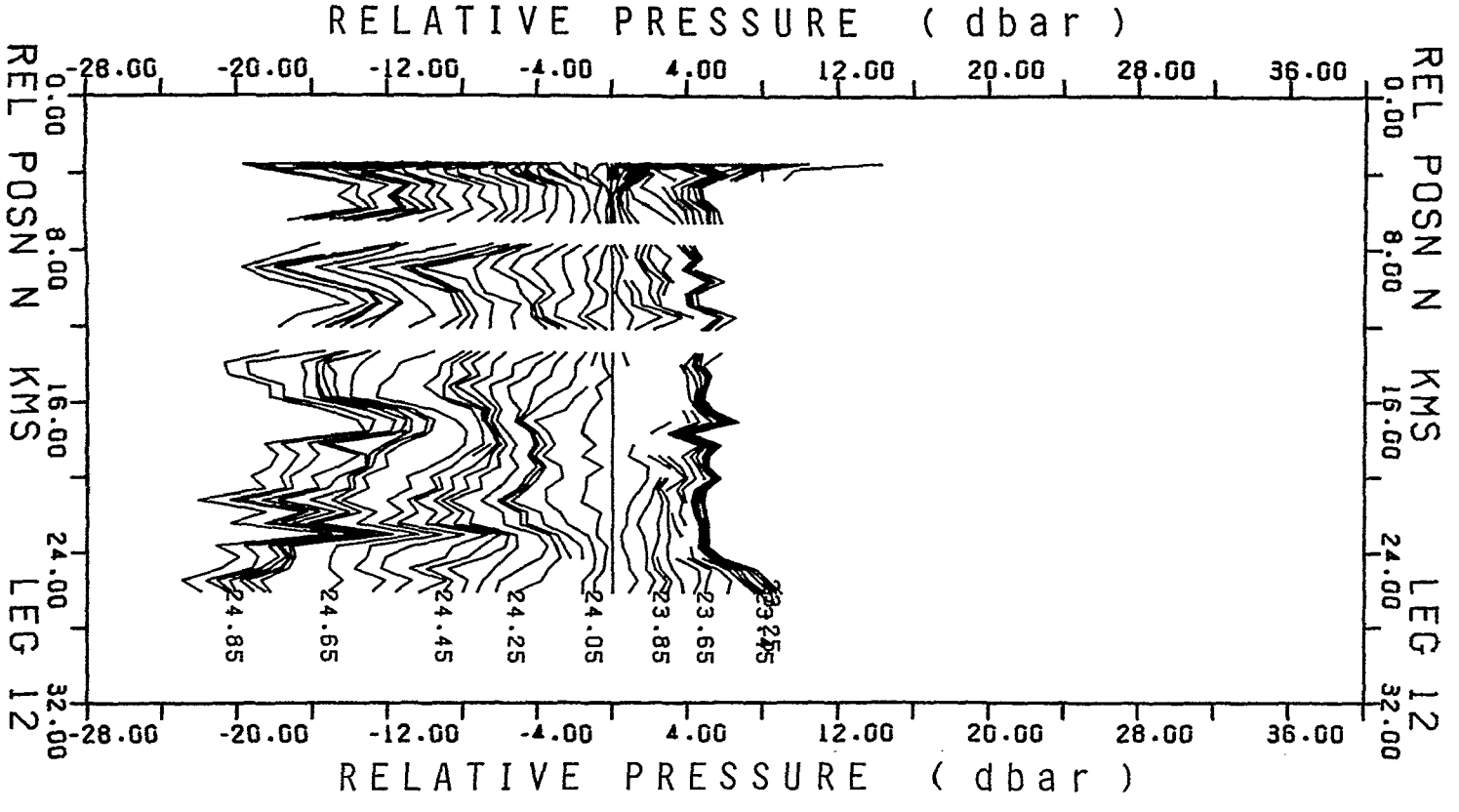
-Relative Pressure on Isopycnals-



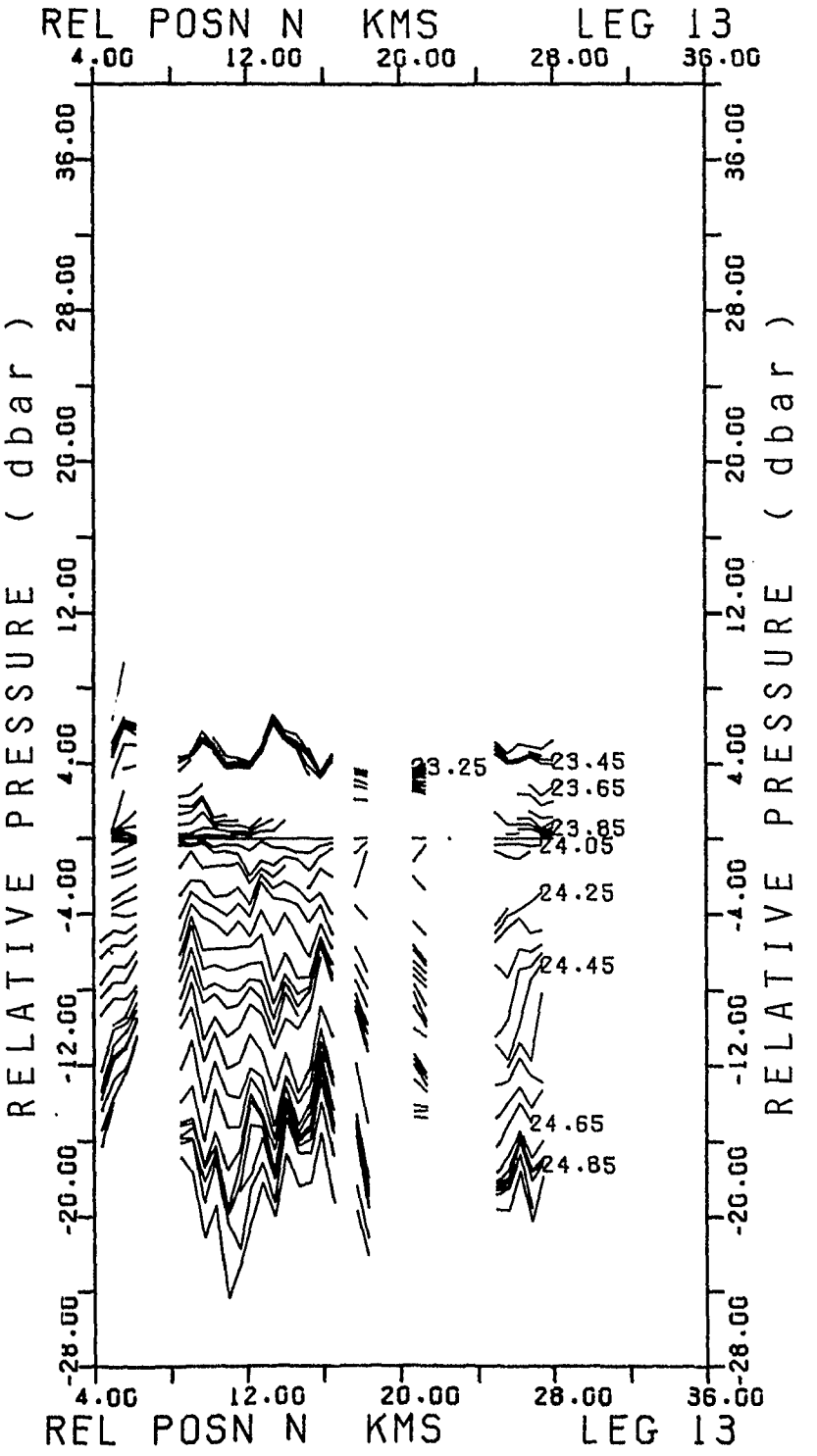
-Relative Pressure on Isopycnals-



-Relative Pressure on Isopycnals-



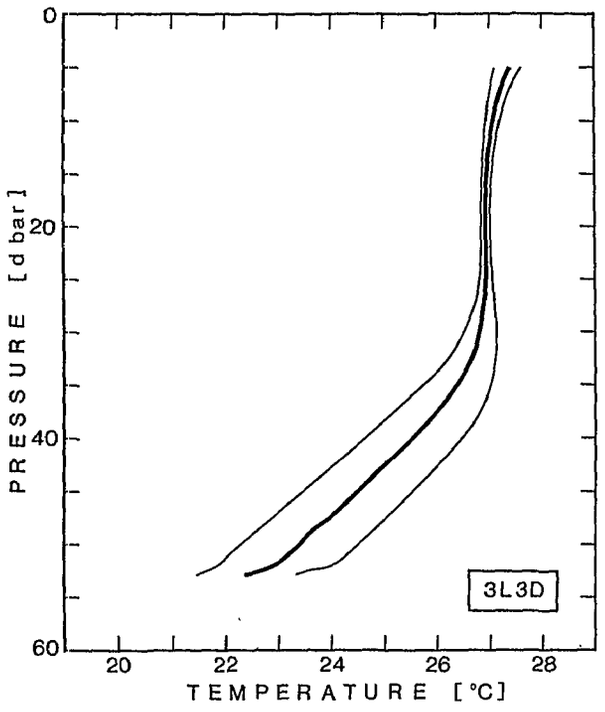
-Relative Pressure on Isopycnals-

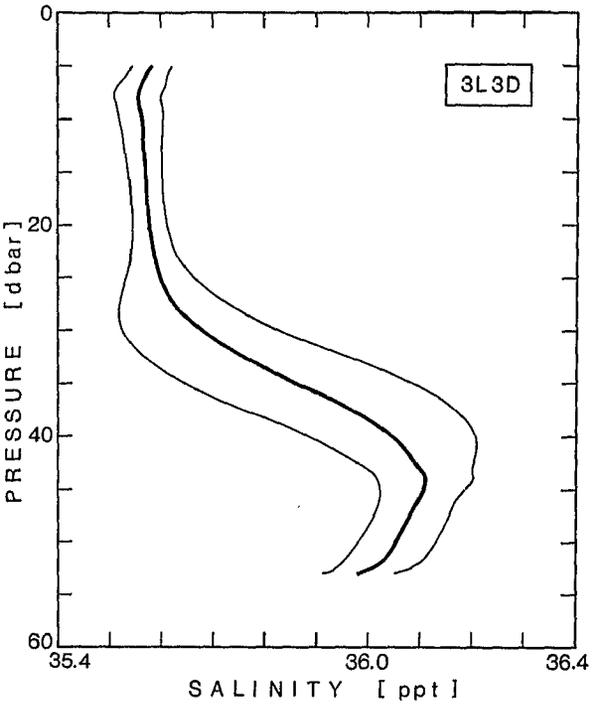


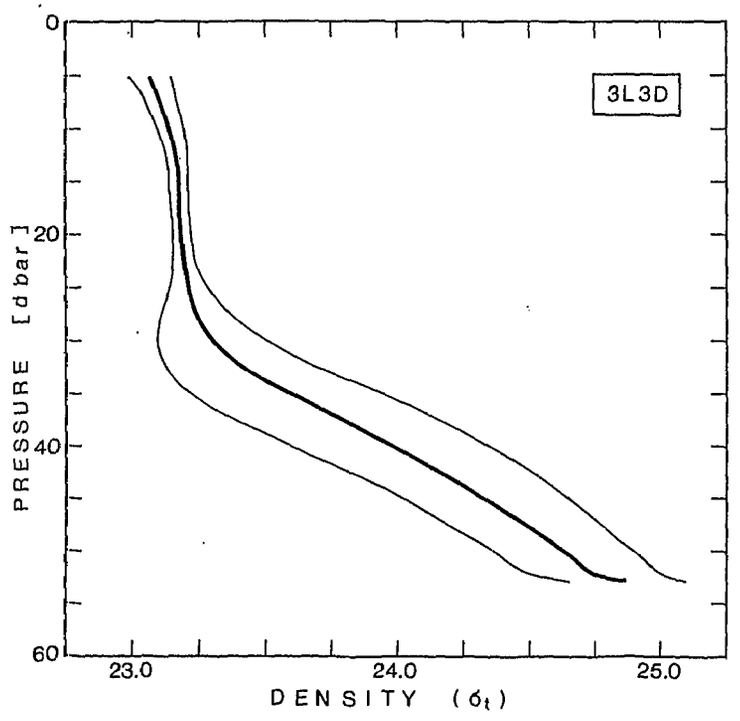
-Relative Pressure on Isopycnals-

SECTION IV STATISTICS OF THE DATA

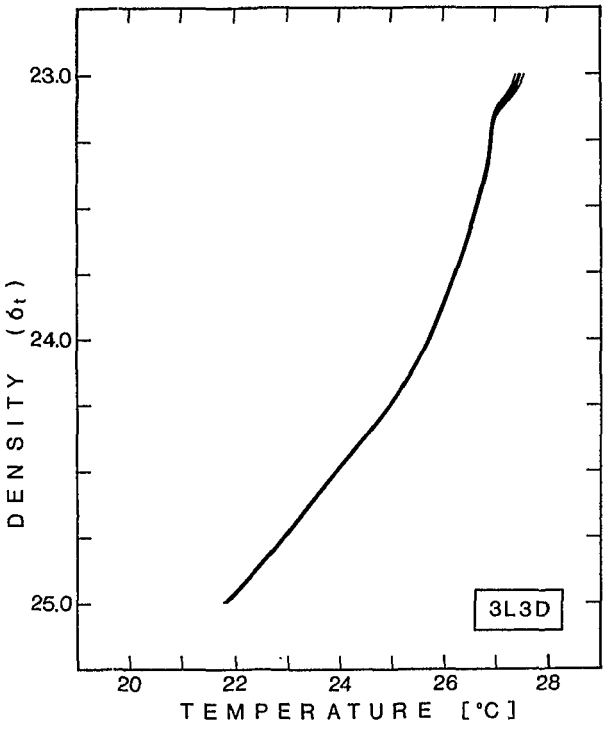
In this Section appear diagrams of the mean and standard deviations of the data on surfaces of constant pressure, constant σ_t and constant potential temperature. In addition the profiles of potential temperature and salinity as functions of σ_t are for the sake of comparison redrawn as functions of pressure making use of the mean relationship between pressure and σ_t. The standard deviations of potential temperature and salinity on pressure surfaces and on σ_t surfaces (converted back to pressure coordinates) are drawn together to show the difference between the signal due to internal waves and the signal due to thermohaline variability. Histograms of salinity and normalized thickness on surfaces of constant σ_t are also shown. Profiles of the residual left after the objective analysis onto regular grids of the data on surfaces of constant σ_t or constant pressure are shown together with profiles of the standard deviation of the input data for the objective analysis.

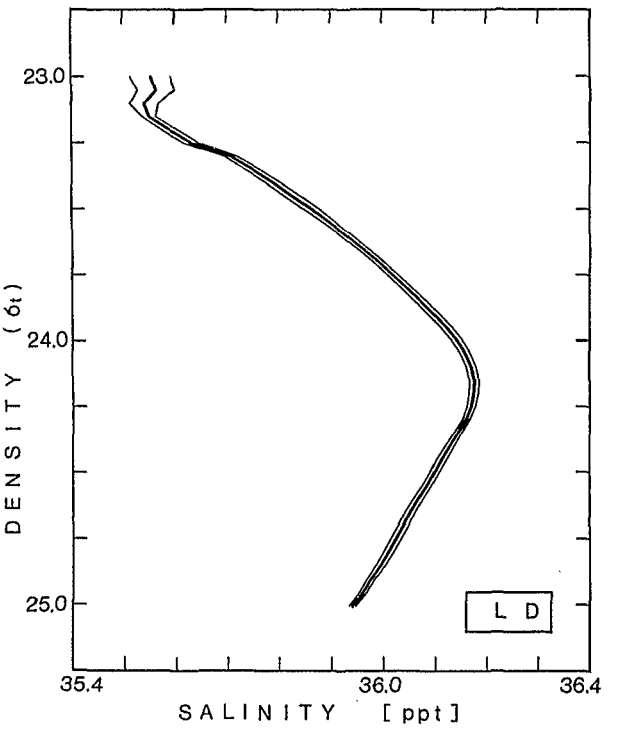


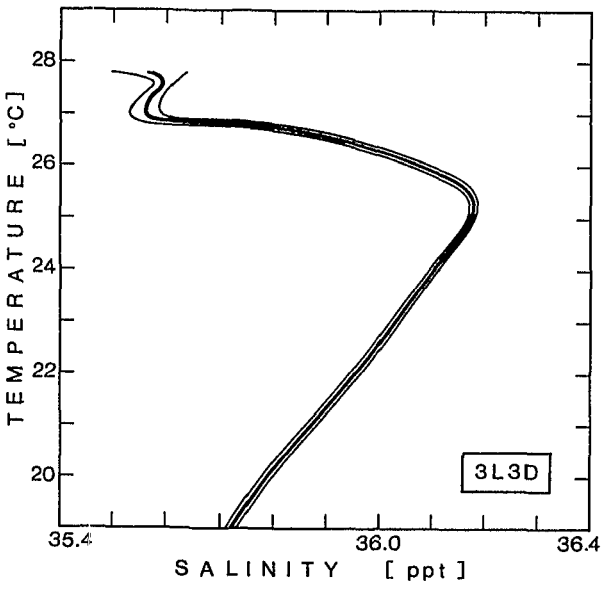




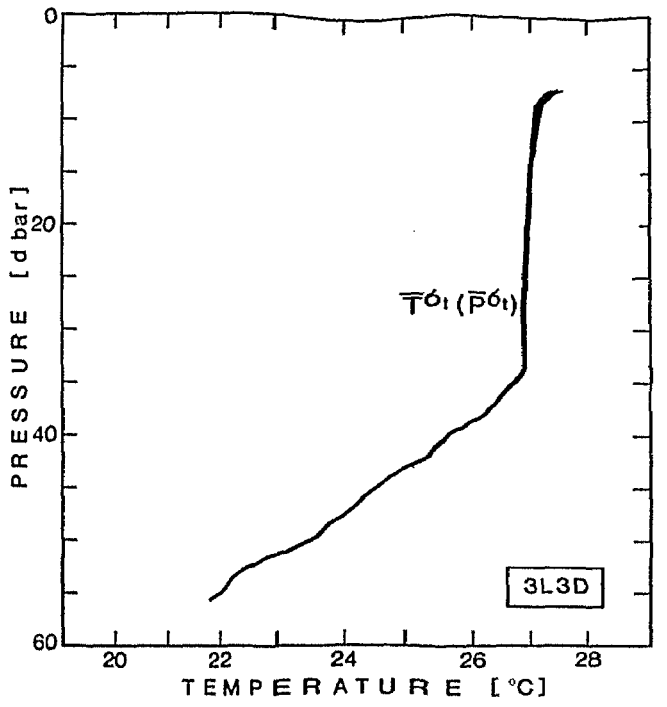
Profiles of the mean and standard deviation of potential temperature, salinity and density on surfaces of constant pressure

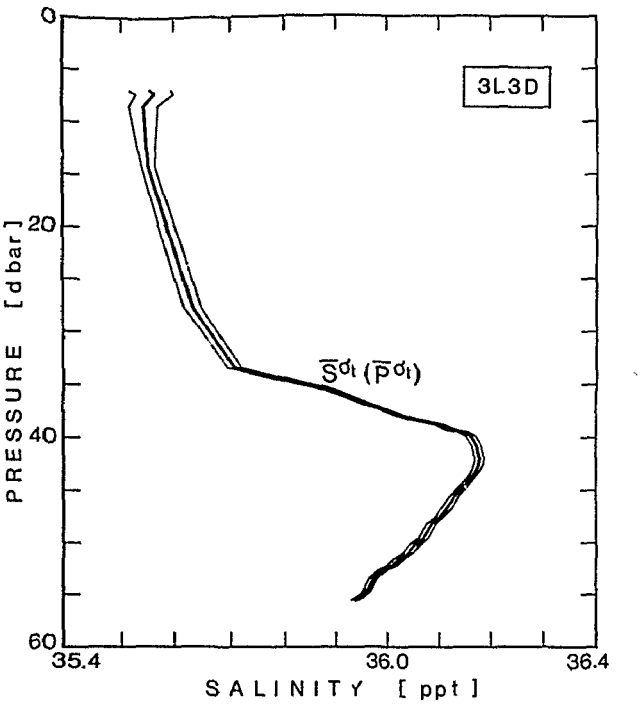




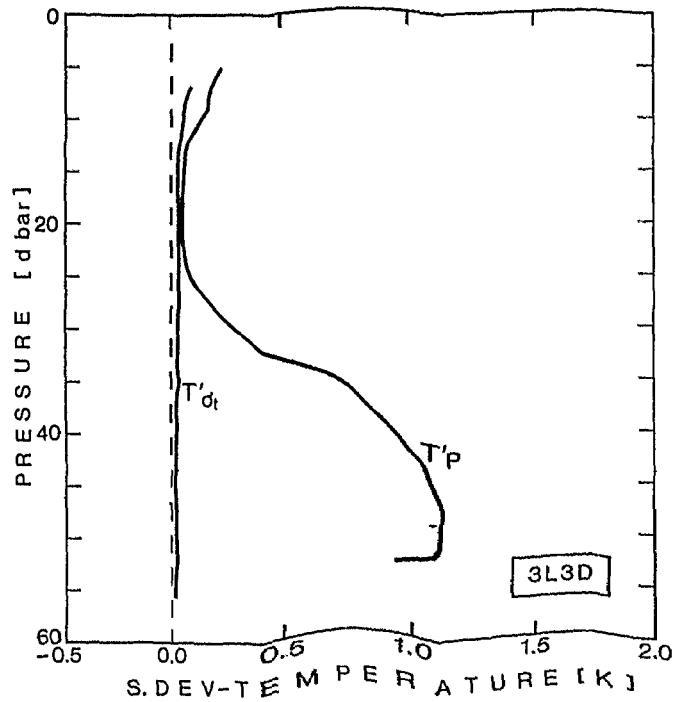


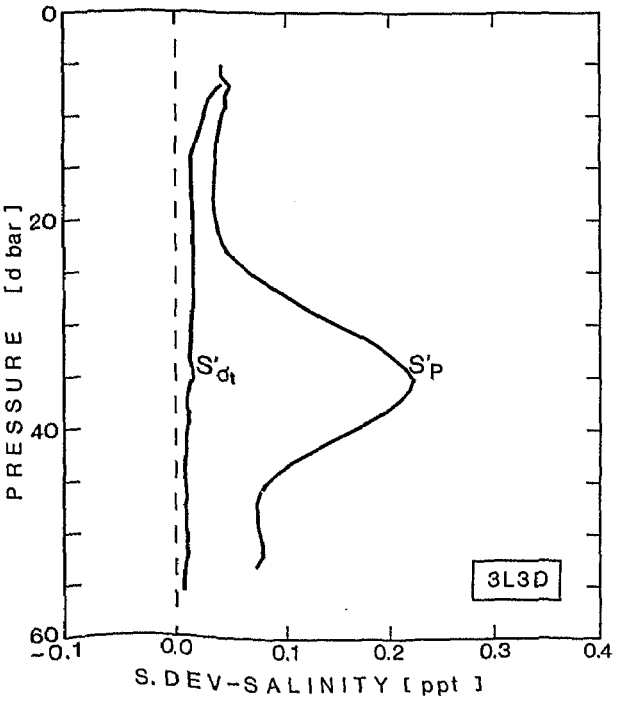
Profiles of the mean and standard deviation of potential temperature and salinity on surfaces of constant σ_t (upper figures) and also salinity on surfaces of constant potential temperature (mean T-S diagram, lower figure).



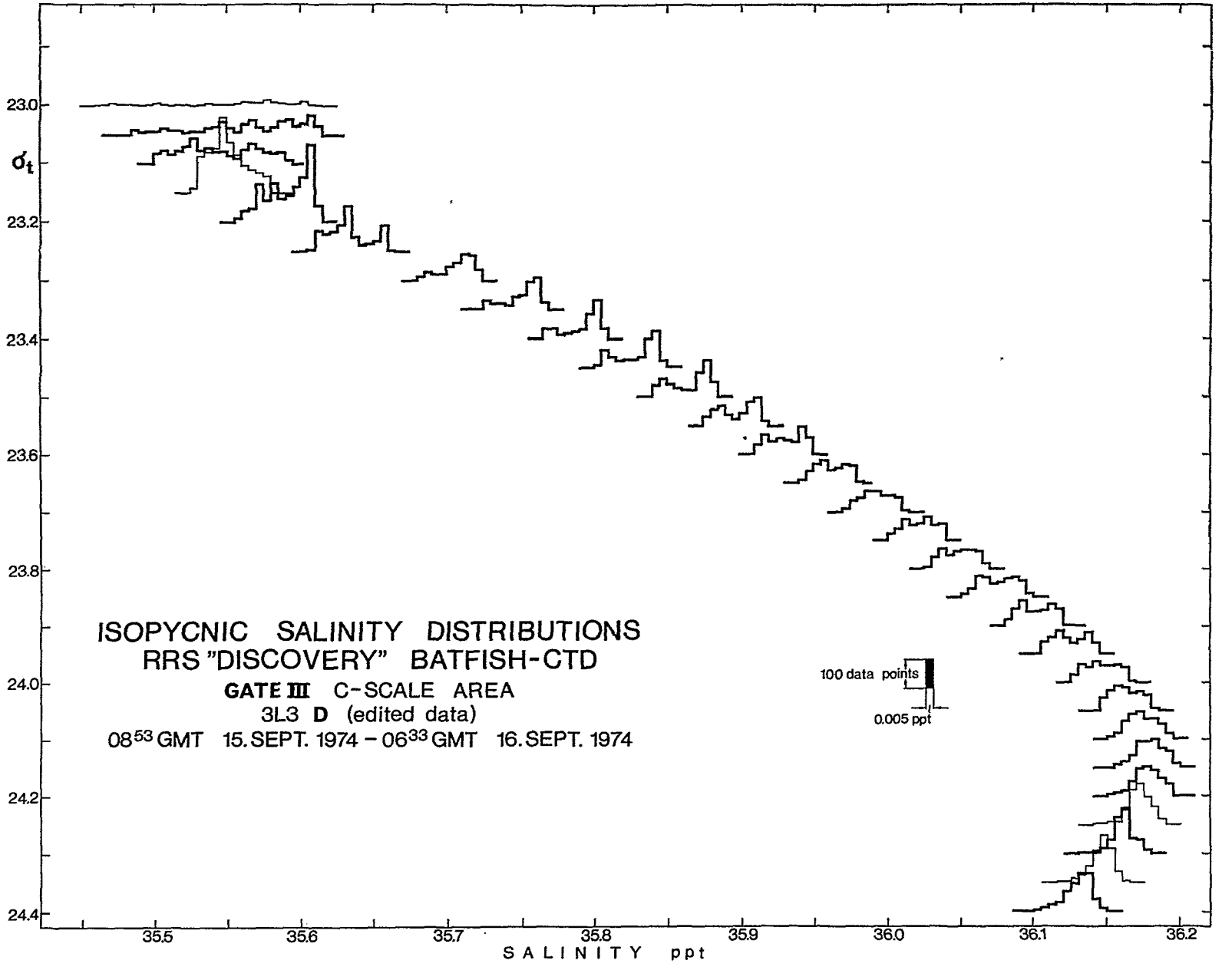


Profiles of the mean and standard deviation of potential temperature and salinity on surfaces of constant σ_t redrawn as functions of pressure using the mean relationship of σ_t to pressure.

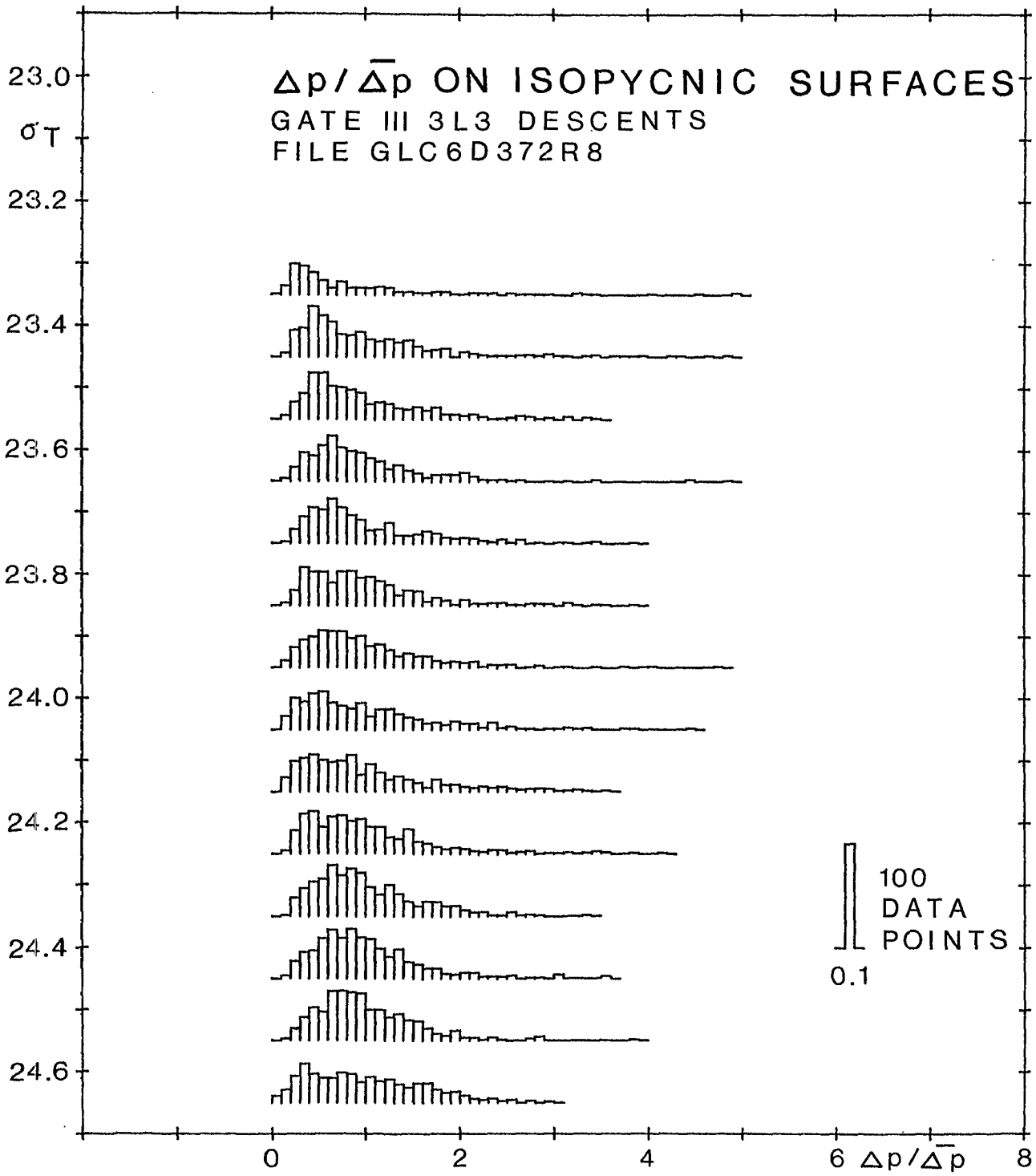




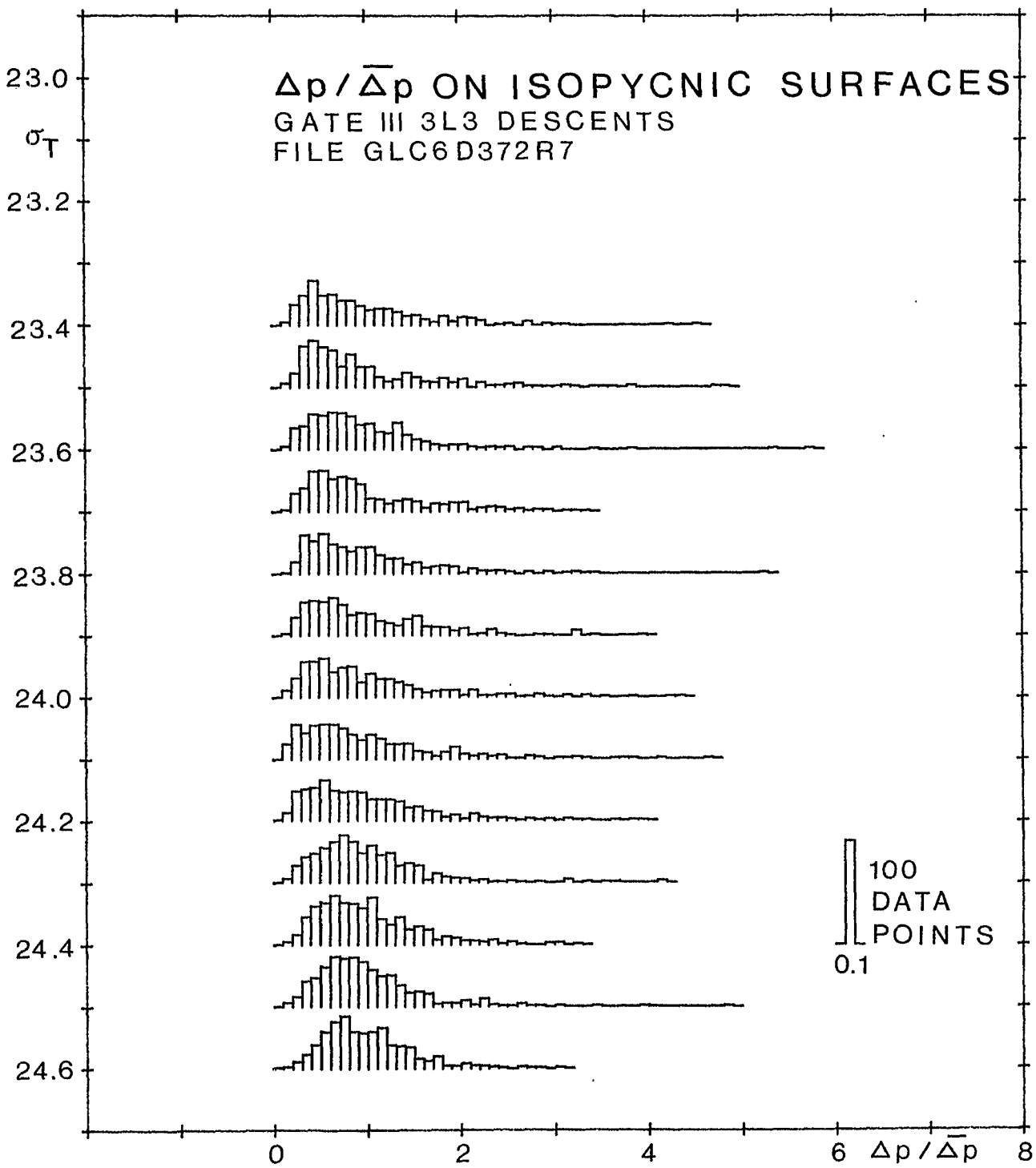
Profiles of the standard deviation of potential temperature and salinity on surfaces of constant pressure and constant σ_t for comparison.



Histogram of salinity on surfaces of constant σ_t



Histograms of normalized thickness on surfaces of constant σ_t. The thicknesses are normalized by the mean thickness on their surface to remove the effect of changes in the mean density gradient. The mean, standard deviation, skewness and kurtosis of the thickness on each surface is shown in the accompanying table.

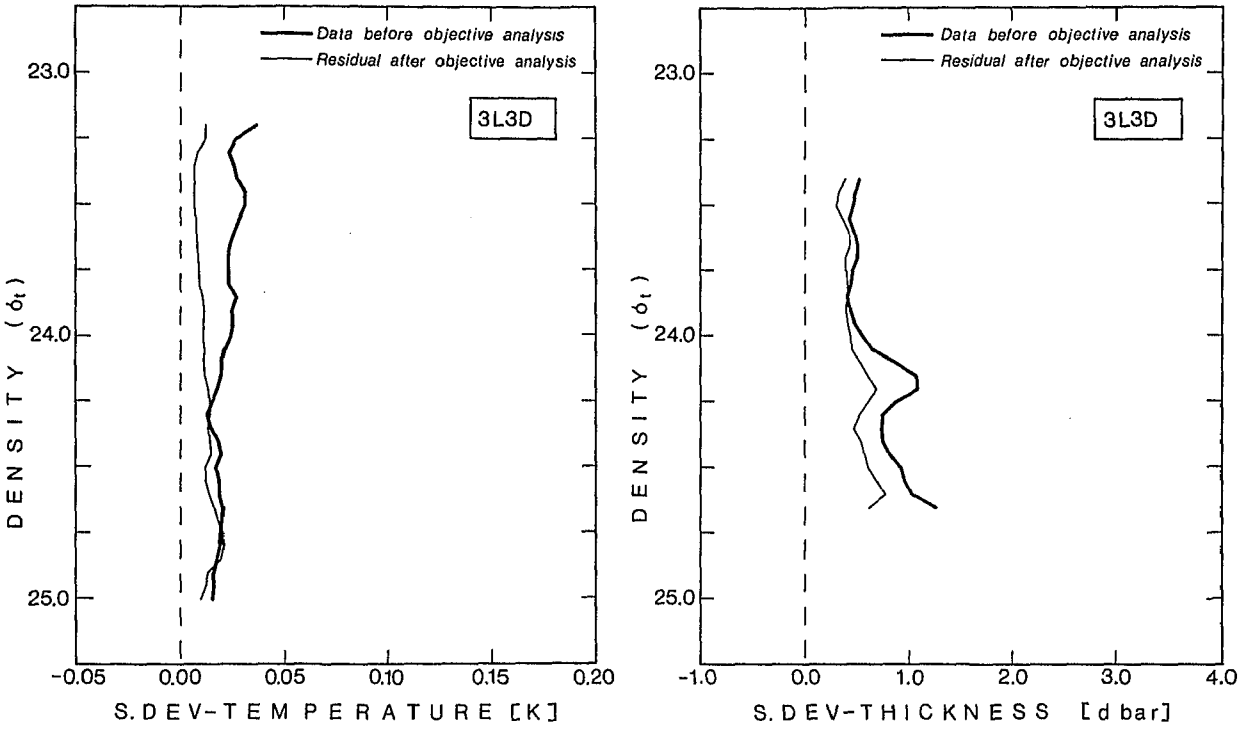

Δp/Δ̄p ON ISOPYCNIC SURFACES
GATE III 3L3 DESCENTS
FILE GLC6D372R7
σT
23.0
23.2
23.4
23.6
23.8
24.0
24.2
24.4
24.6
0
2
4
6
8
Δp/Δ̄p
100
DATA
POINTS
0.1

Thickness on Surfaces of Constant Sigma-T: Statistics

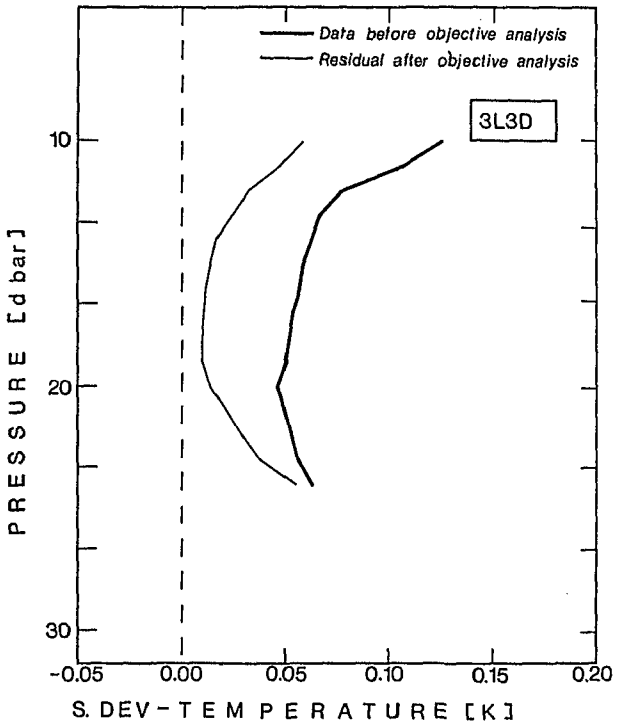
Map 3L3 Descents

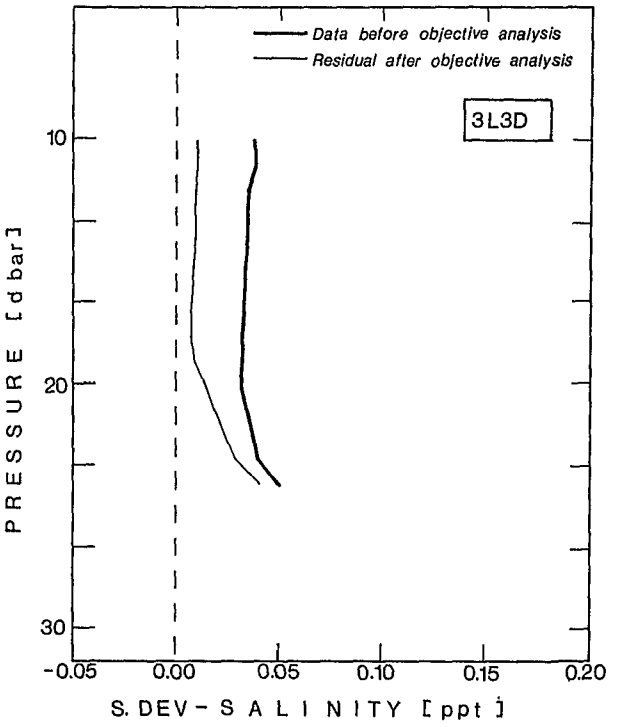
Filename GLC6D372R7

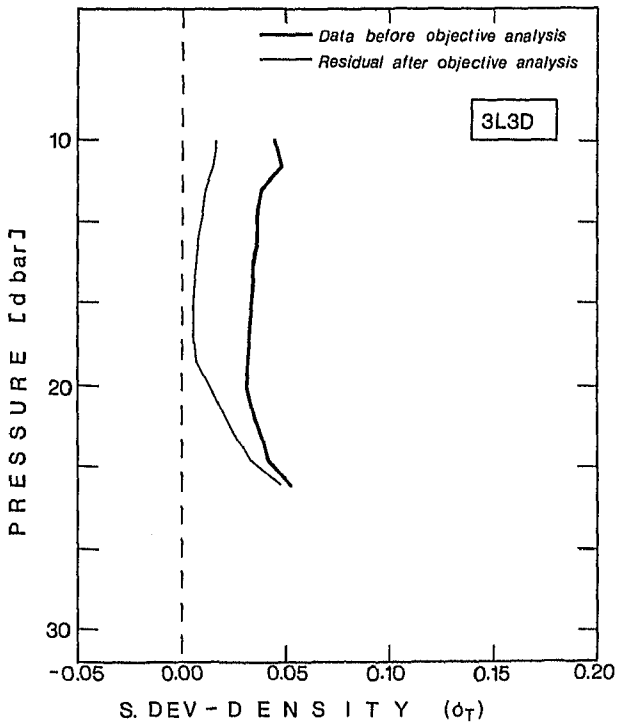
Surface-Value	Mean	St.Devn	Skewness	Kurtosis
23.40	.780236	.5863	2.928	20.44
23.50	.671531	.5060	1.912	7.481
23.60	.828779	.5520	2.485	14.19
23.70	.899251	.5778	1.239	4.027
23.80	.824409	.5400	1.823	8.482
23.90	.801032	.5144	1.414	5.467
24.00	.908799	.6371	1.673	6.555
24.10	1.319783	.9577	1.601	6.307
24.20	1.740461	1.150	1.429	5.598
24.30	1.423216	.8351	1.870	8.842
24.40	1.646893	.8723	1.181	4.704
24.50	1.870352	1.031	1.927	10.12
24.60	2.506615	1.179	1.123	4.848
Filename GLC6D372R8				
23.35	1.903042	2.218	3.051	14.31
23.45	.681497	.5253	2.103	8.446
23.55	.742785	.5097	1.985	9.761
23.65	.889470	.5812	2.069	9.829
23.75	.854617	.5465	1.448	5.226
23.85	.807961	.5107	1.590	6.102
23.95	.857249	.5651	1.824	8.116
24.05	1.037323	.7354	1.465	5.693
24.15	1.647848	1.146	1.224	4.141
24.25	1.495979	.9637	1.587	6.374
24.35	1.577876	.8456	1.041	4.040
24.45	1.692509	.9267	1.398	5.888
24.55	2.185270	1.106	1.289	6.009
24.65	2.332610	1.395	.5823	2.719



Profiles of the residual (rms error) after objective analysis onto regular grids and the standard deviation before objective analysis of potential temperature and thickness on constant σ_t = 23.20 - 25.00 for potential temperature and σ_t = 23.40 - 24.65 for thickness.







Profiles of the residual after objective analysis onto regular grids and the standard deviations before objective analysis of potential temperature, salinity and σ_t on constant pressure in the range p = 10.00 - 24.00 dbar.

SECTION V ISOPYCNIC MAPS

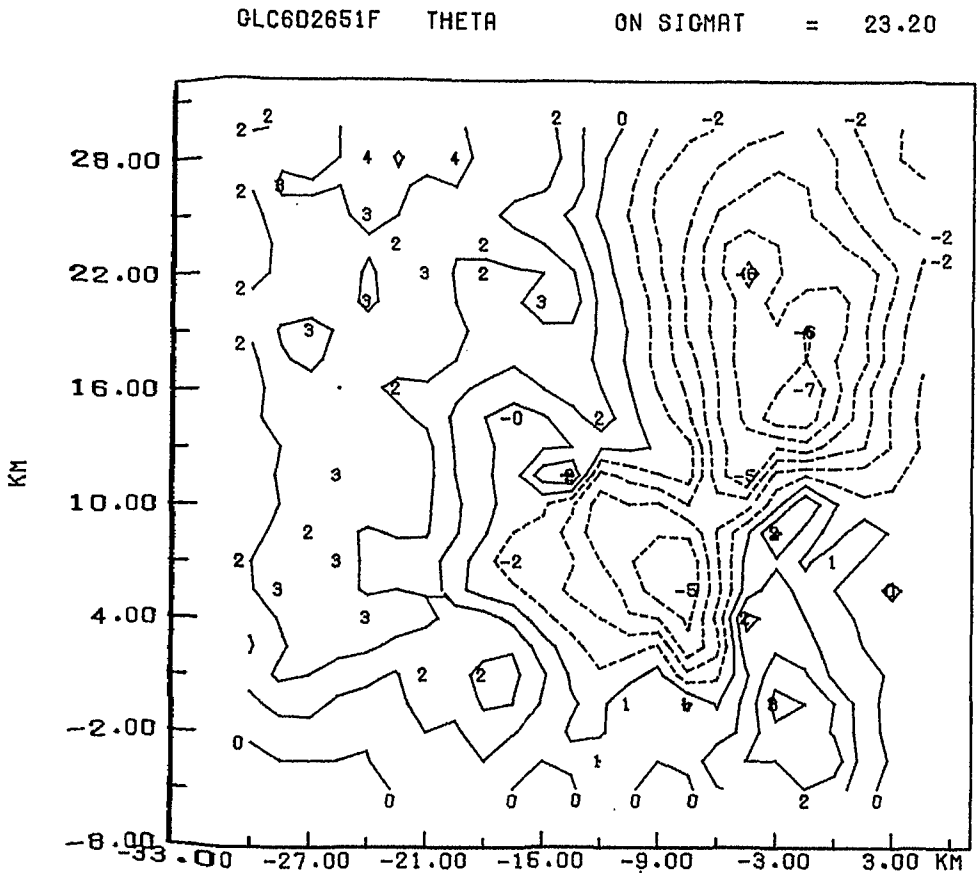
This section shows contoured maps of potential temperature and thickness (the spacing between successive isopycnal surfaces) on surfaces of constant σ_t in the range 23.20 - 25.00 σ_t and 23.40 - 24.65 σ_t respectively.

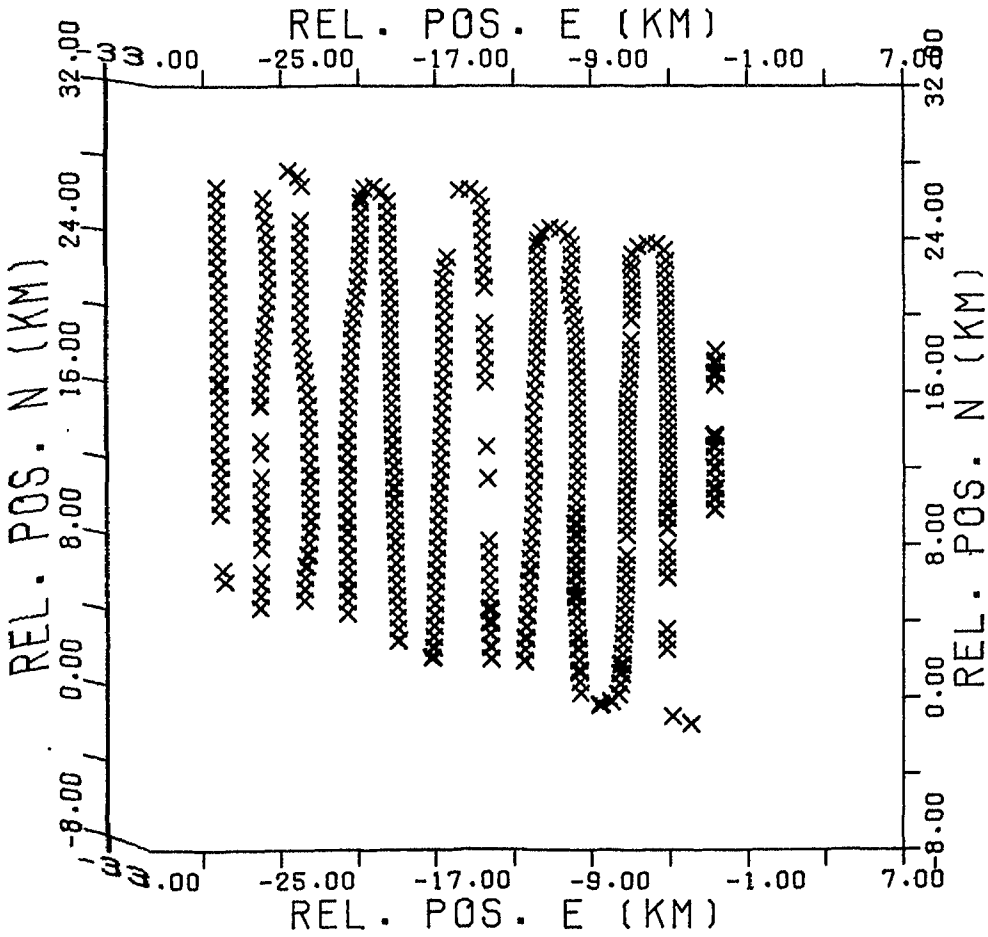
The data are the product of the objective analysis, the data being interpolated onto a regular east-west, north-south grid. The positions of the data (relative to the origin of the map) used in the objective analysis are shown together with each surface. These maps are mainly in the layer of strong density gradient (see Section II).

1. Contoured maps of potential temperature on surfaces of constant σ_t. The range of σ_t covers from 23.20 to 25.00. The contours are of the temperature deviation (units in 10^{-2} K) from the mean temperature on the surface. The mean temperature on each surface is given in the following table. The contour interval is 10 mK, the surface interval is 0.05 σ_t and the grid spacing used in the objective analysis was 1.5 km. These maps have a scale of 1 : 400 000.

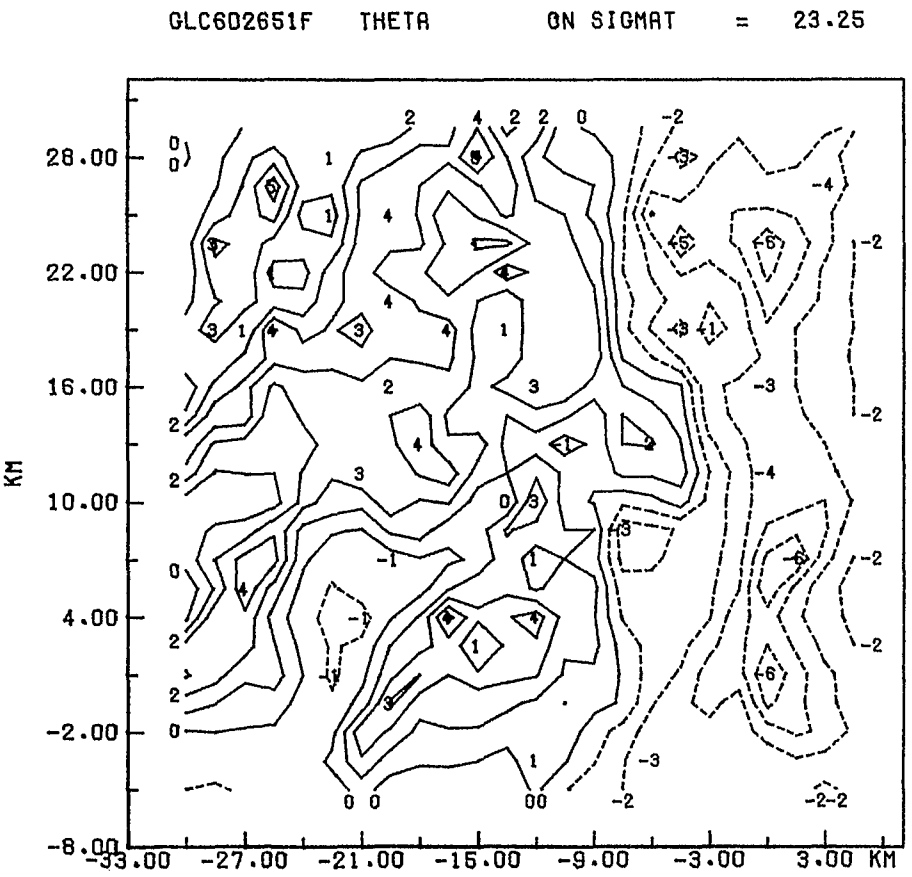
Table of subtracted mean values

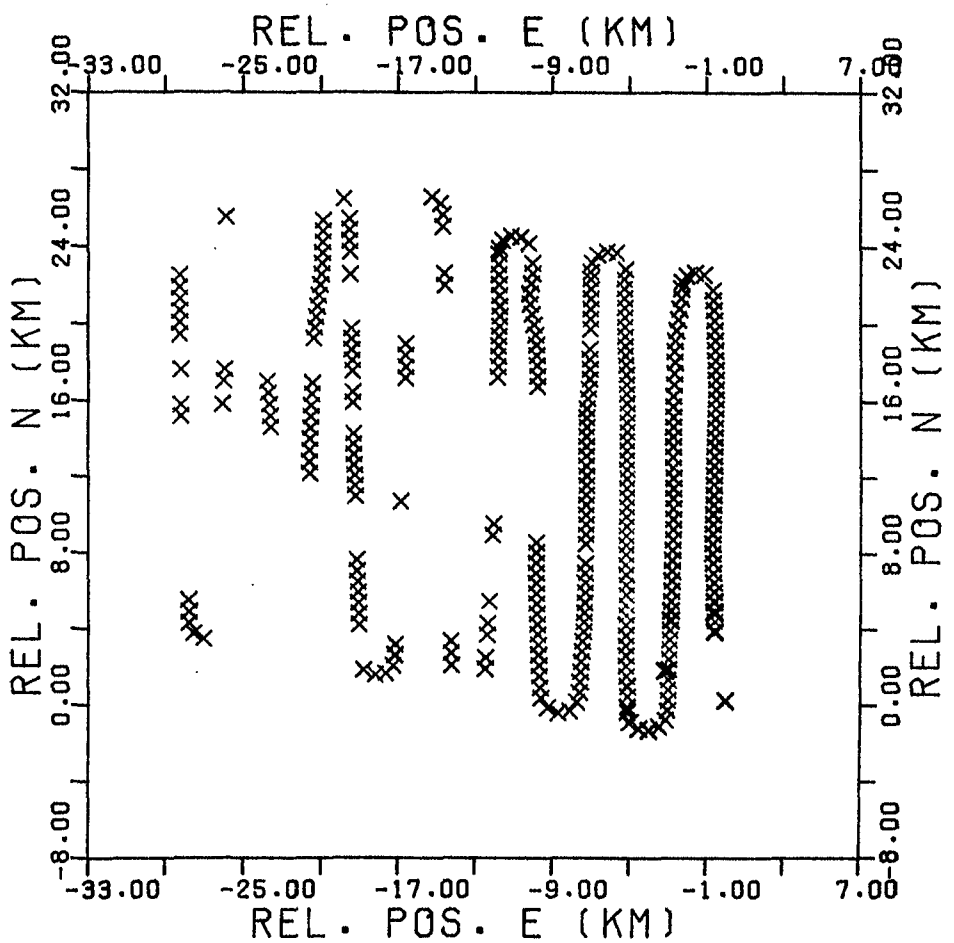
Filename	Surface value (σ_t)	Subtracted mean value (° C)
GLC6D2651F	23.20	26.951
	23.25	26.899
	23.30	26.896
	23.35	26.839
	23.40	26.777
	23.45	26.708
	23.50	26.637
GLC6D1651F	23.55	26.563
	23.60	26.485
	23.65	26.404
	23.70	26.318
	23.75	26.228
	23.80	26.133
	23.85	26.040
	23.90	25.941
	23.95	25.838
	24.00	25.730
	24.05	25.609
	24.10	25.474
	24.15	25.324
	24.20	25.157
	24.25	24.978
GLC6D1652F	24.30	24.787
	24.35	24.581
	24.40	24.376
	24.45	24.167
	24.50	23.962
	24.55	23.757
	24.60	23.545
	24.65	23.336
	24.70	23.129
	24.75	22.916
	24.80	22.701
	24.85	22.483
	24.90	22.254
	24.95	22.032
	25.00	21.803





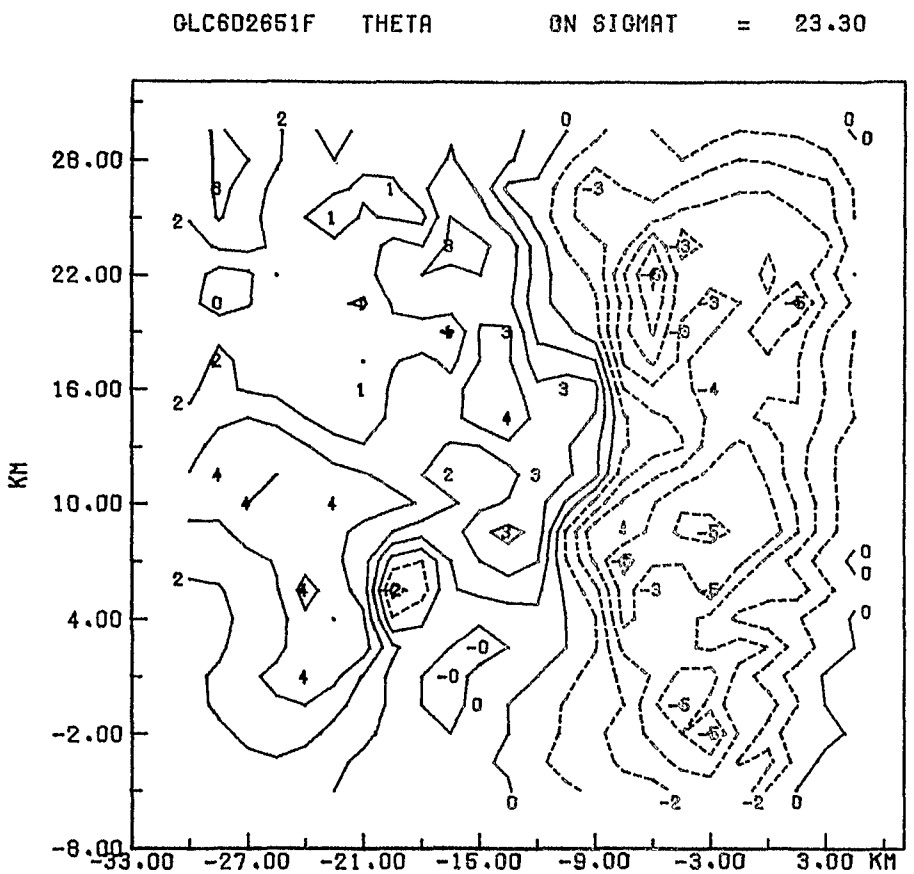
-Potential Temperature on Isopycnic Surfaces-

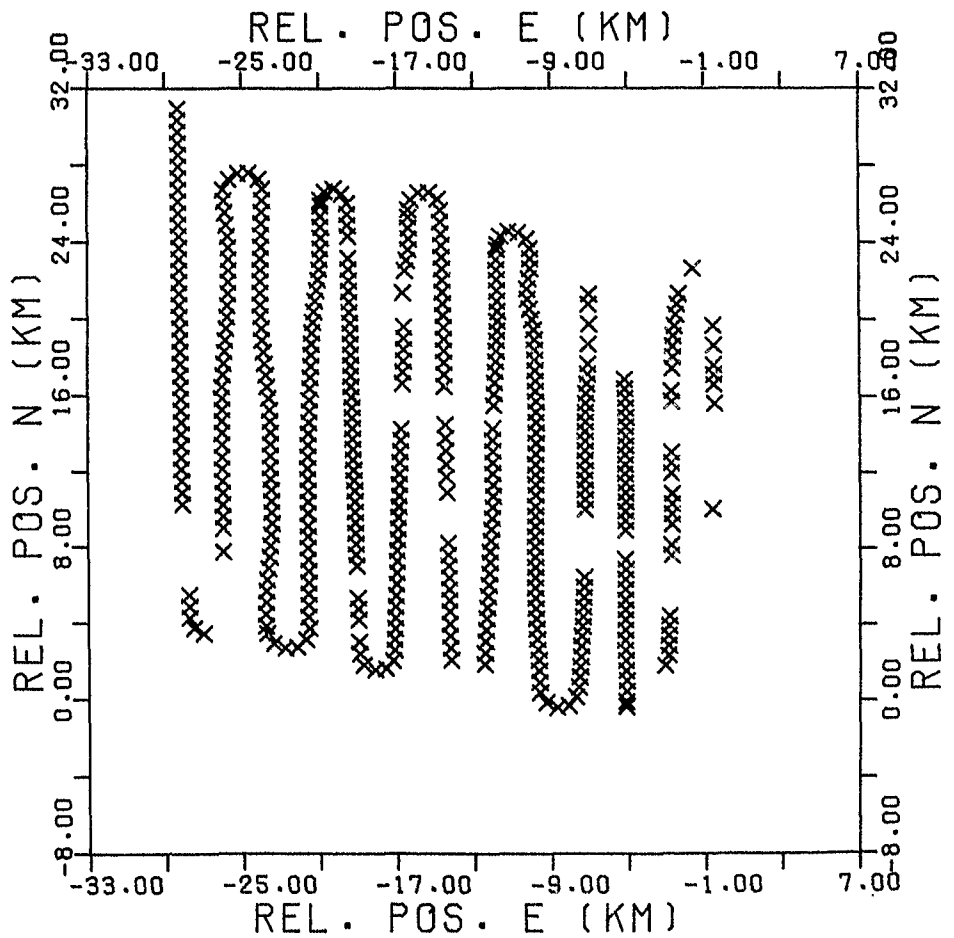


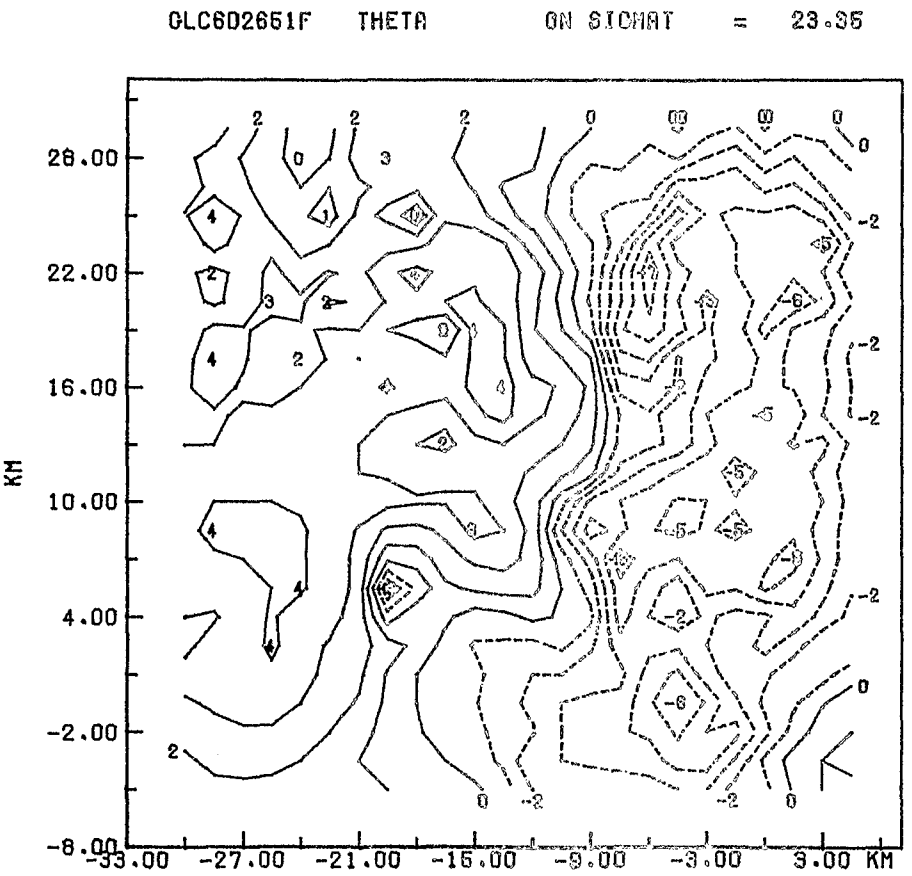


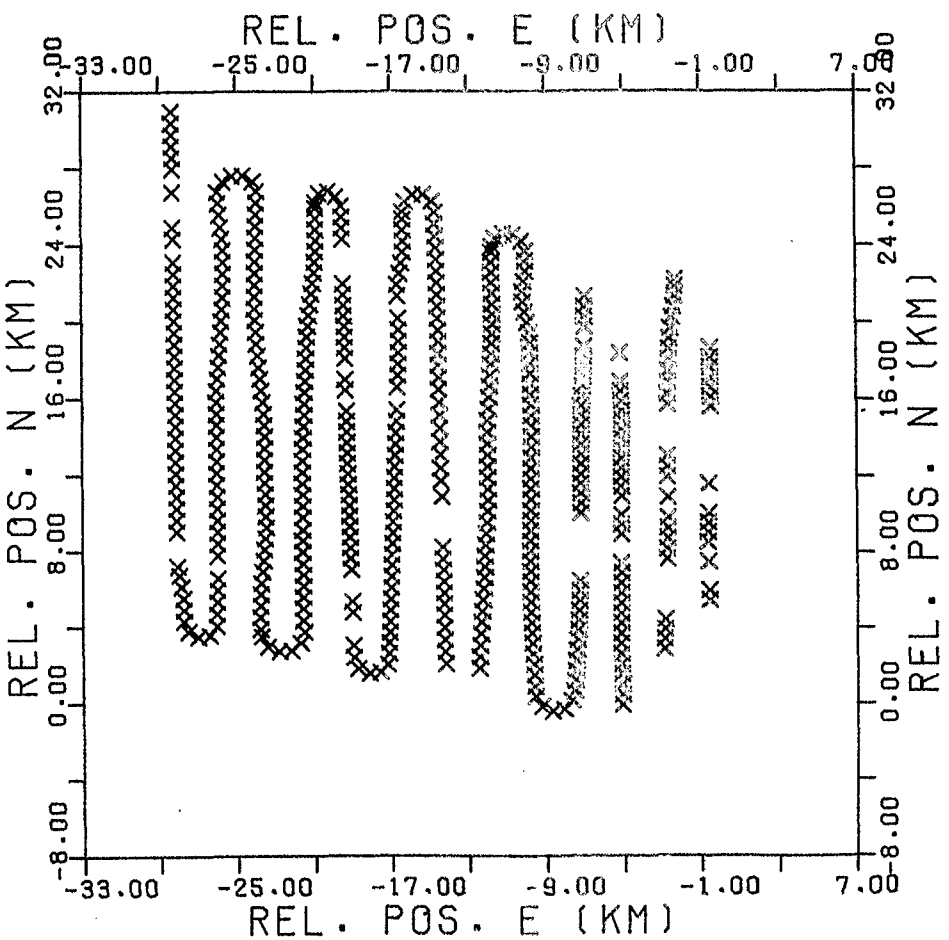
-Potential Temperature on Isopycnic Surfaces-

-Potential Temperature on Isopycnic Surfaces-

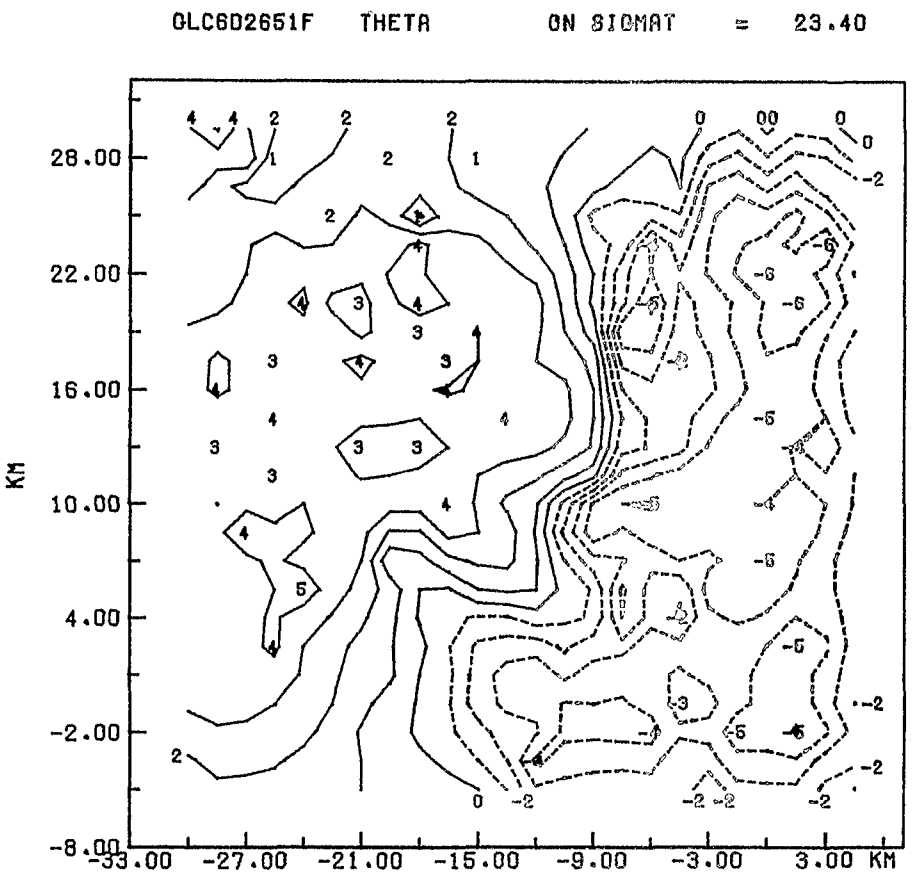


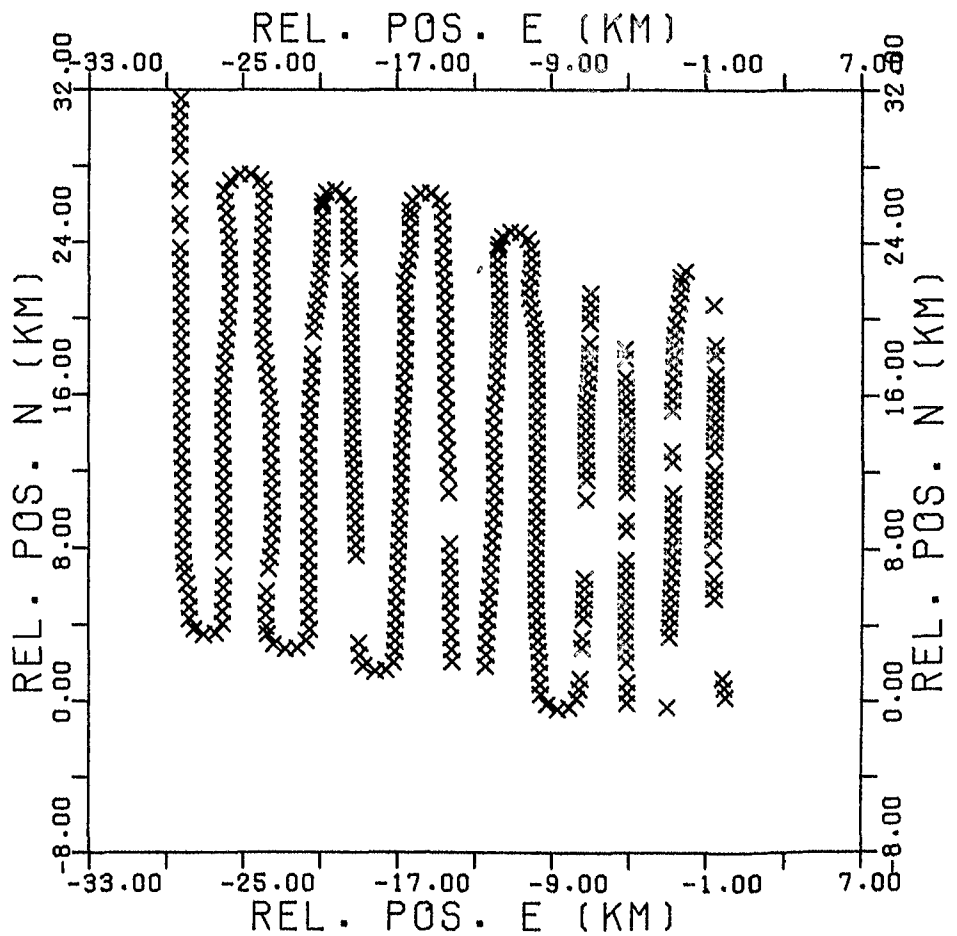






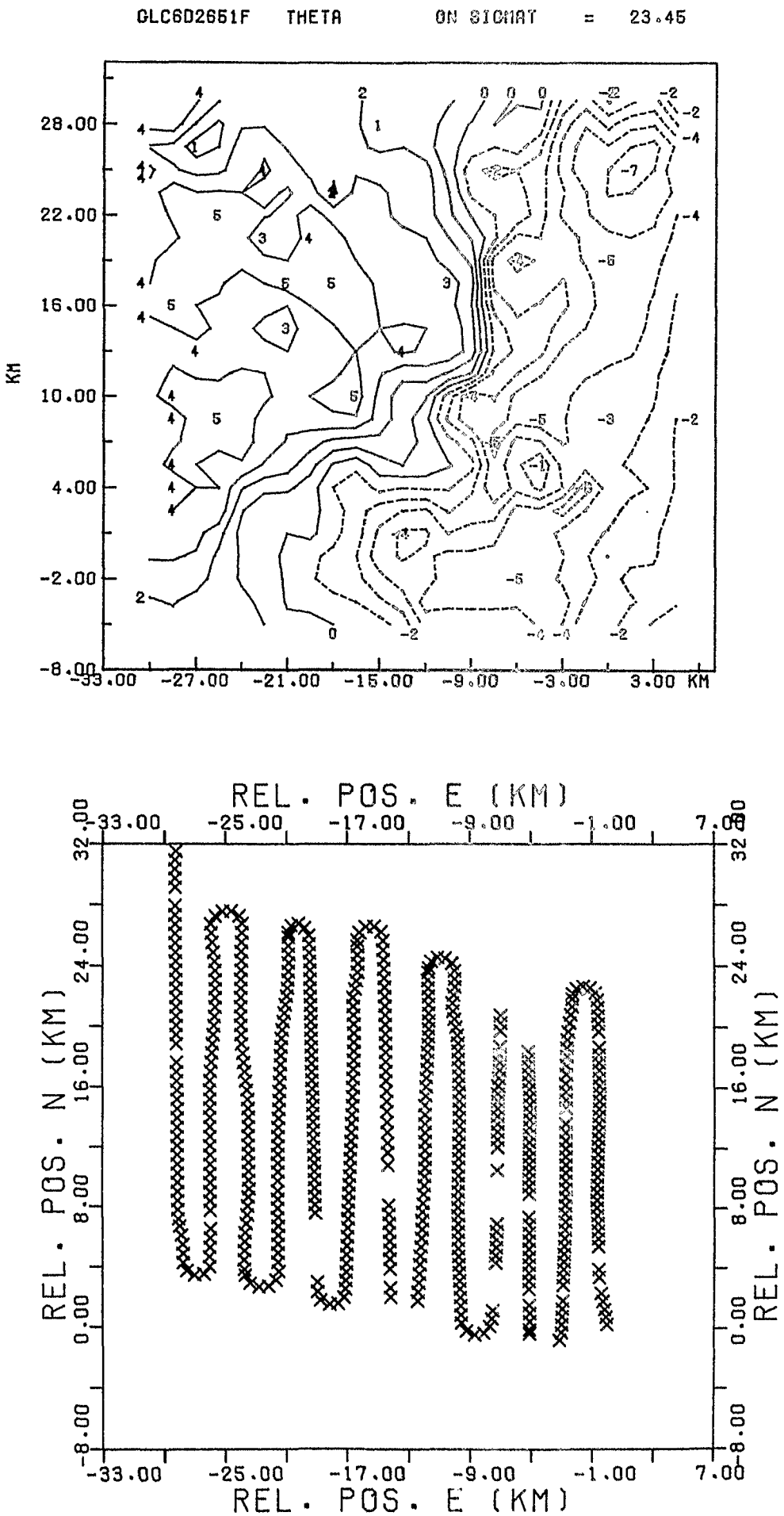
-Potential Temperature on Isopycnic Surfaces-

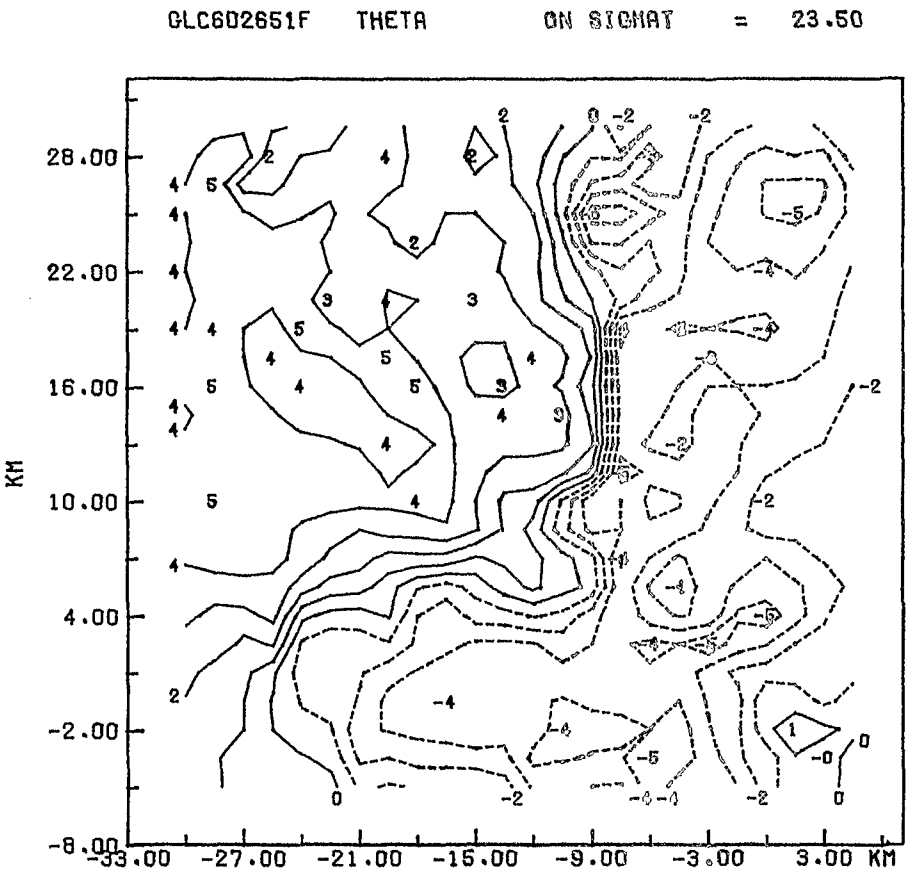


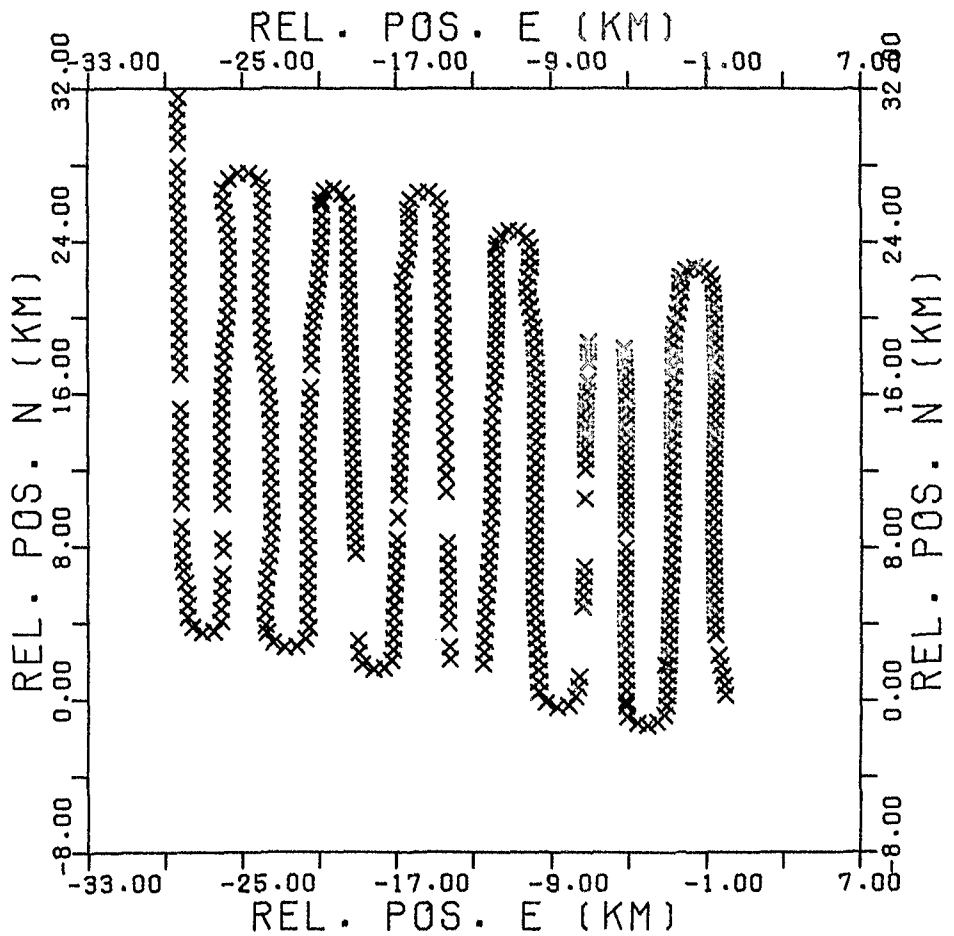


-Potential Temperature on Isopycnic Surfaces-

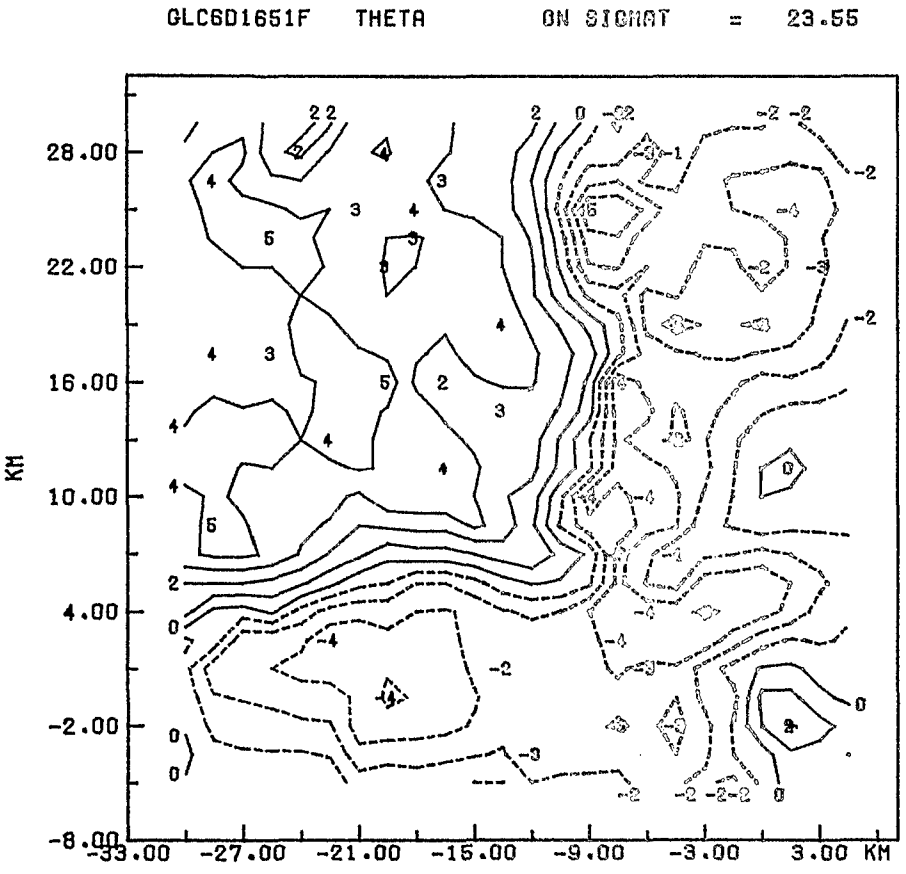
-Potential Temperature on Isopycnic Surfaces-

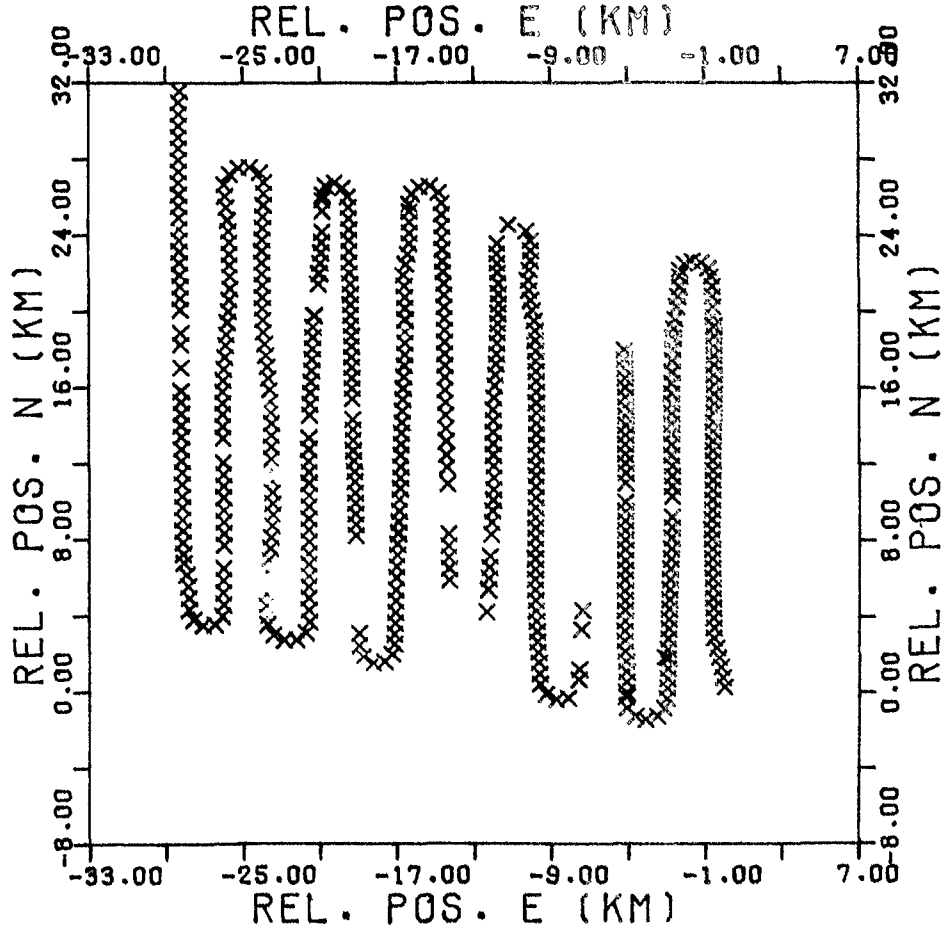




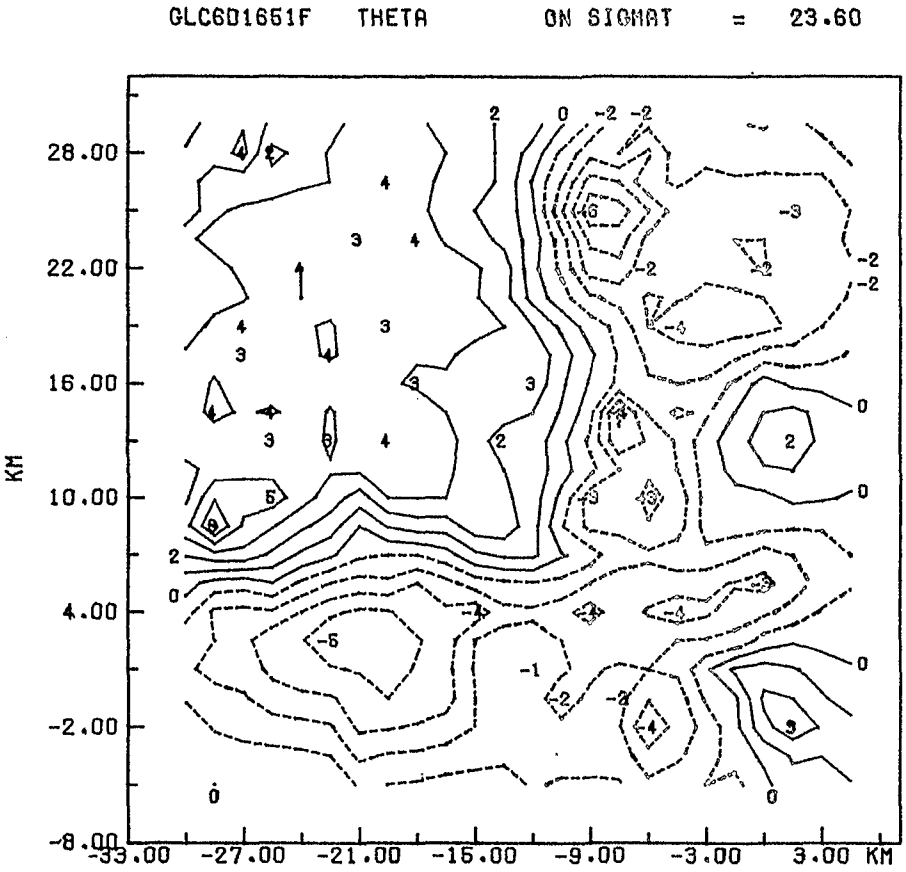


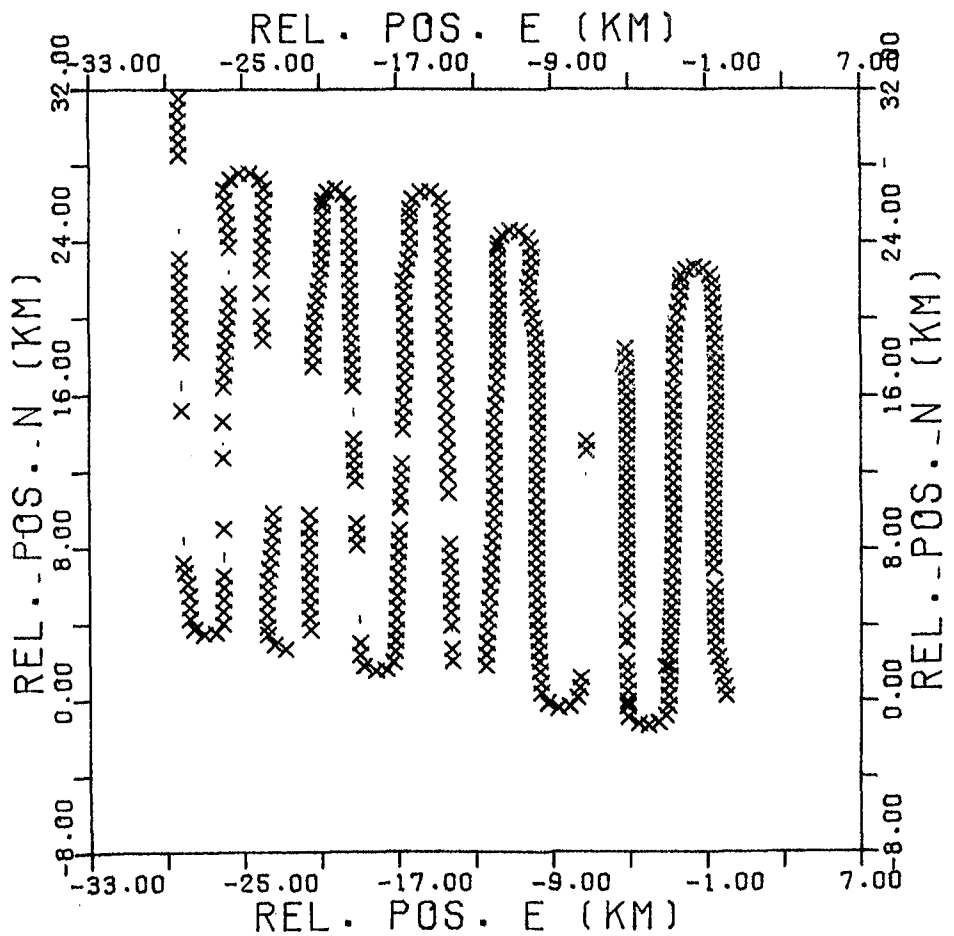
-Potential Temperature on Isopycnic Surfaces-





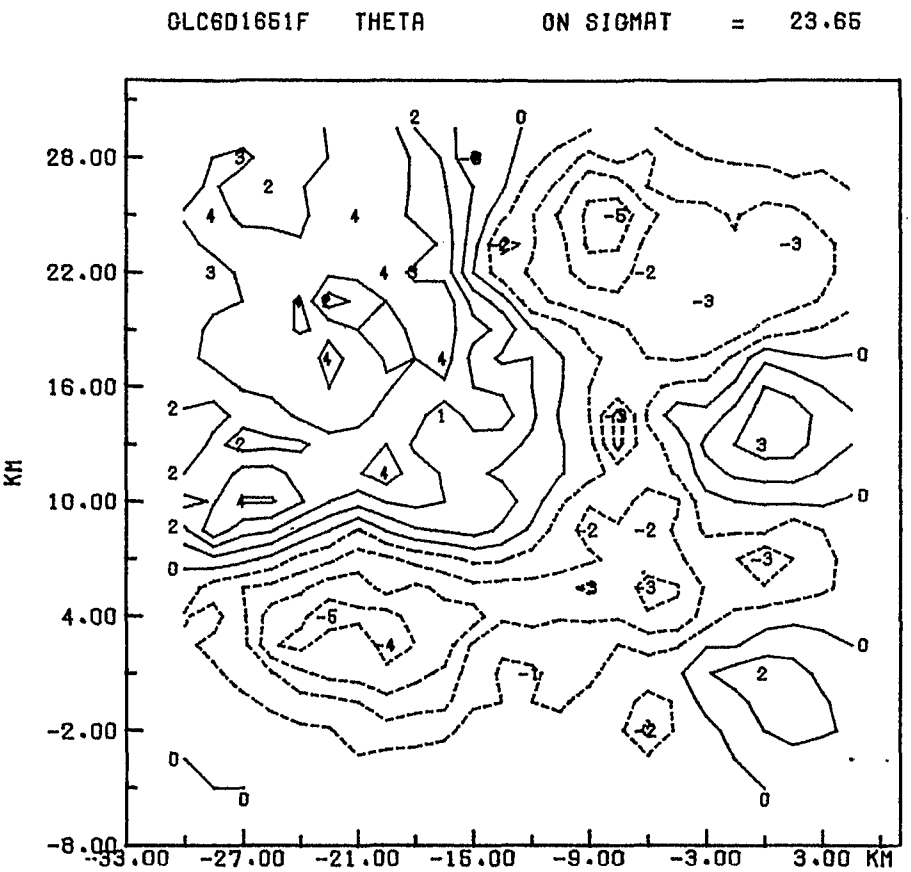
-Potential Temperature on Isopycnic Surfaces-

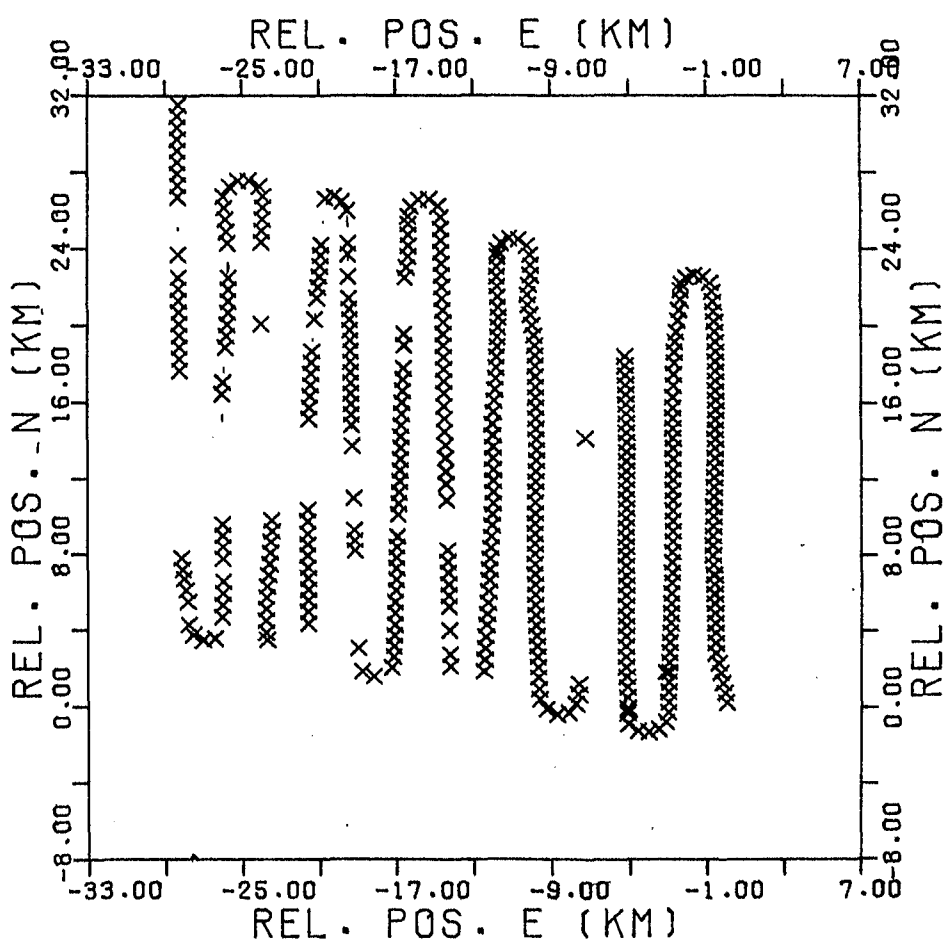


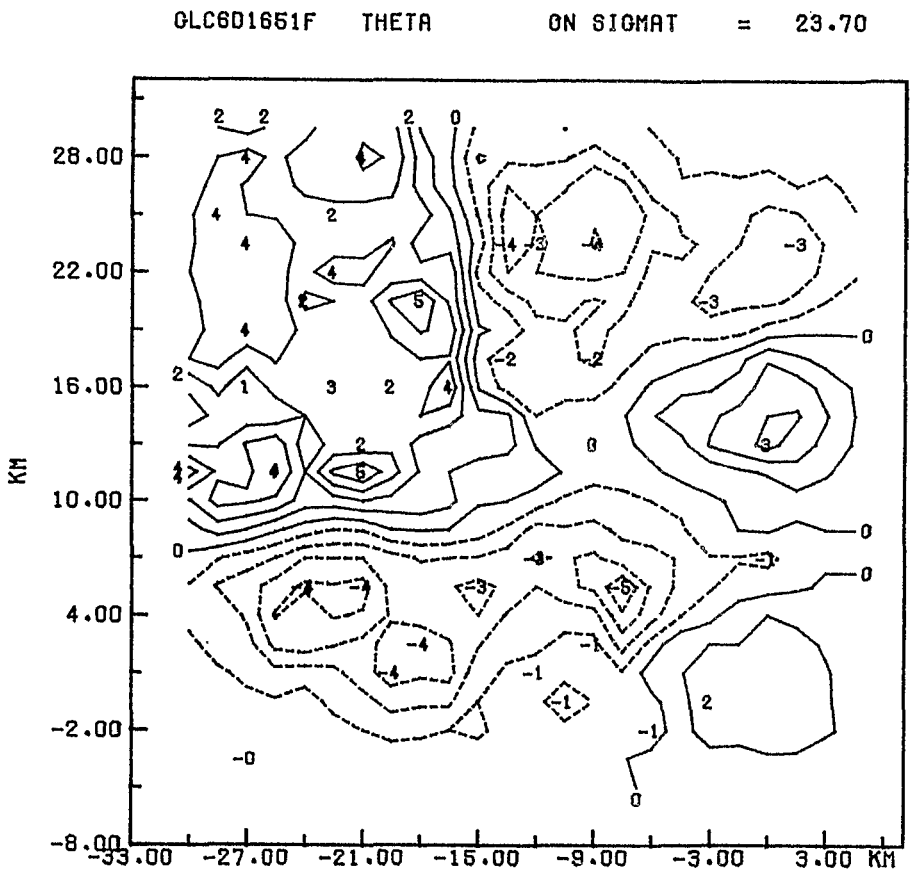


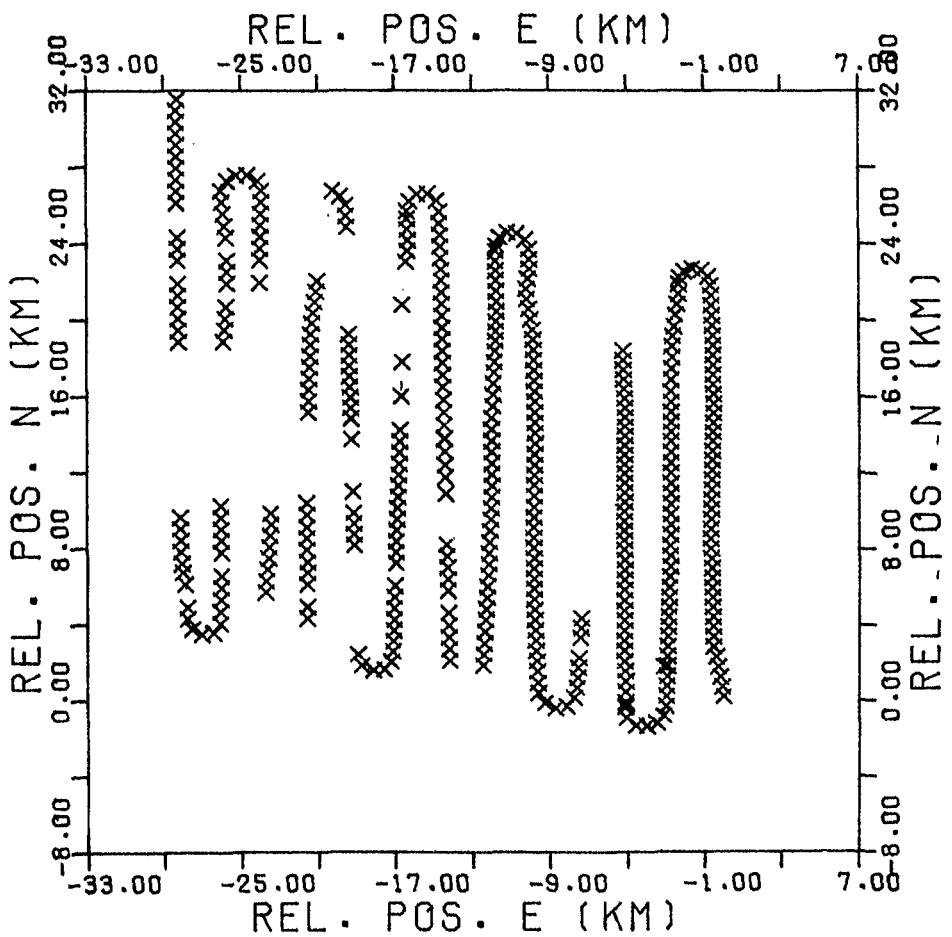
-Potential Temperature on Isopycnic Surfaces-

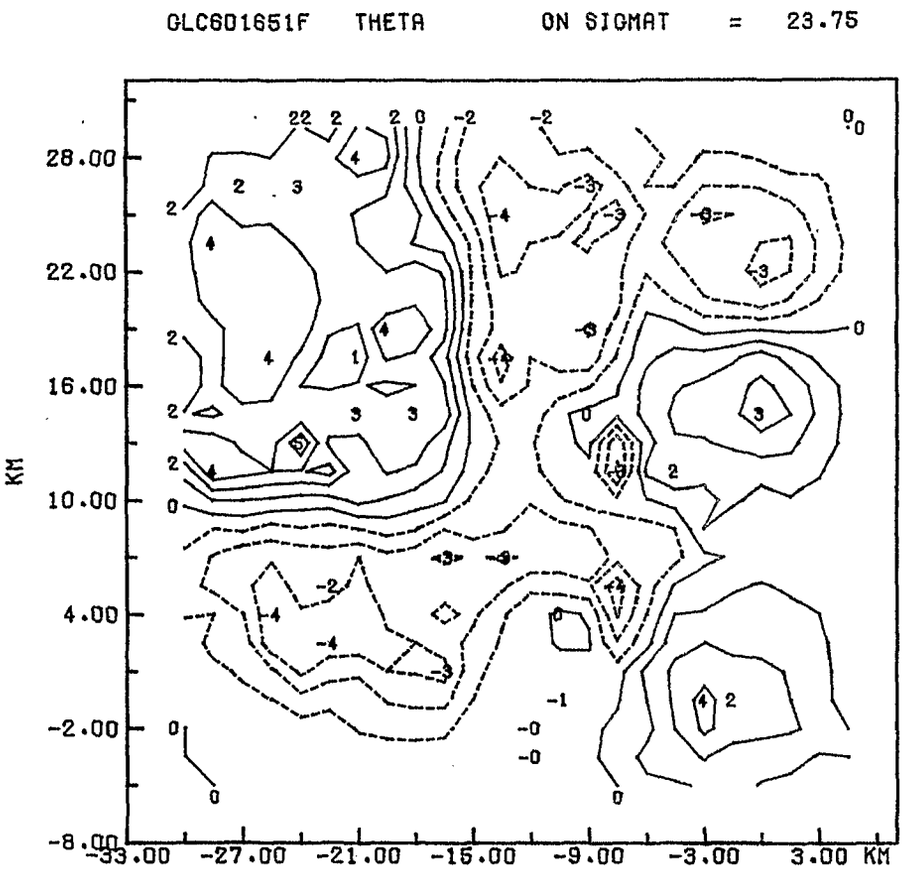
-Potential Temperature on Isopycnic Surfaces-

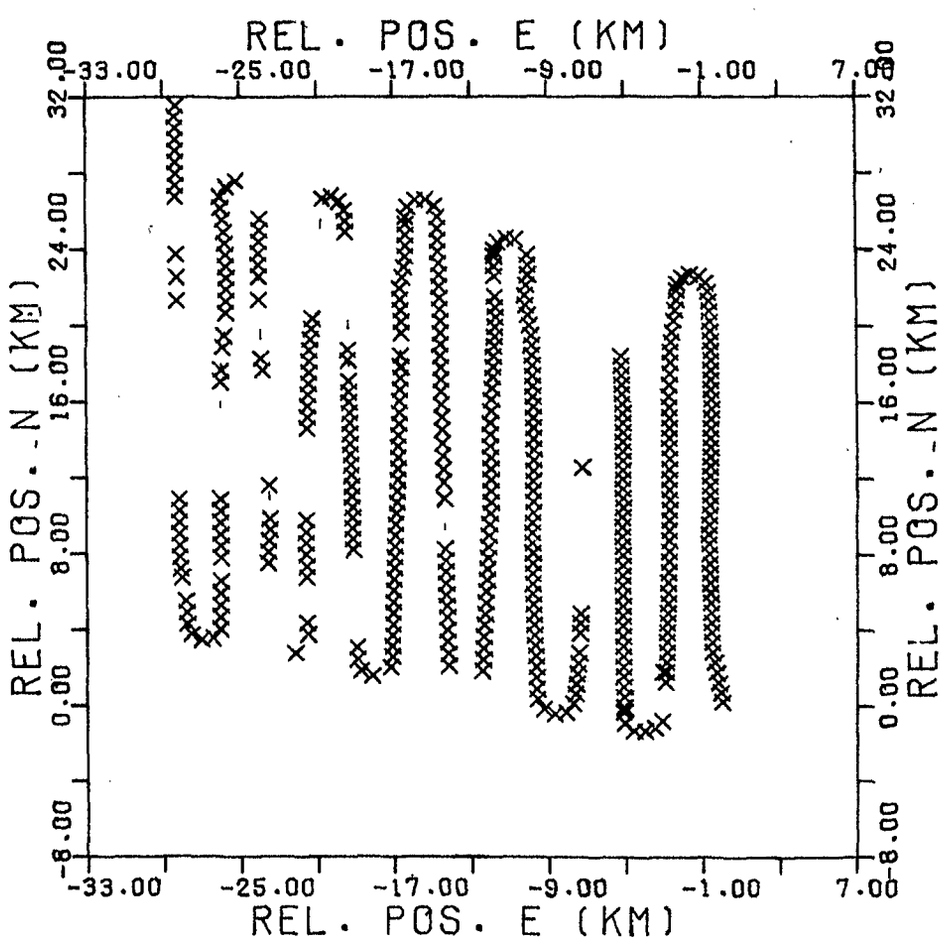




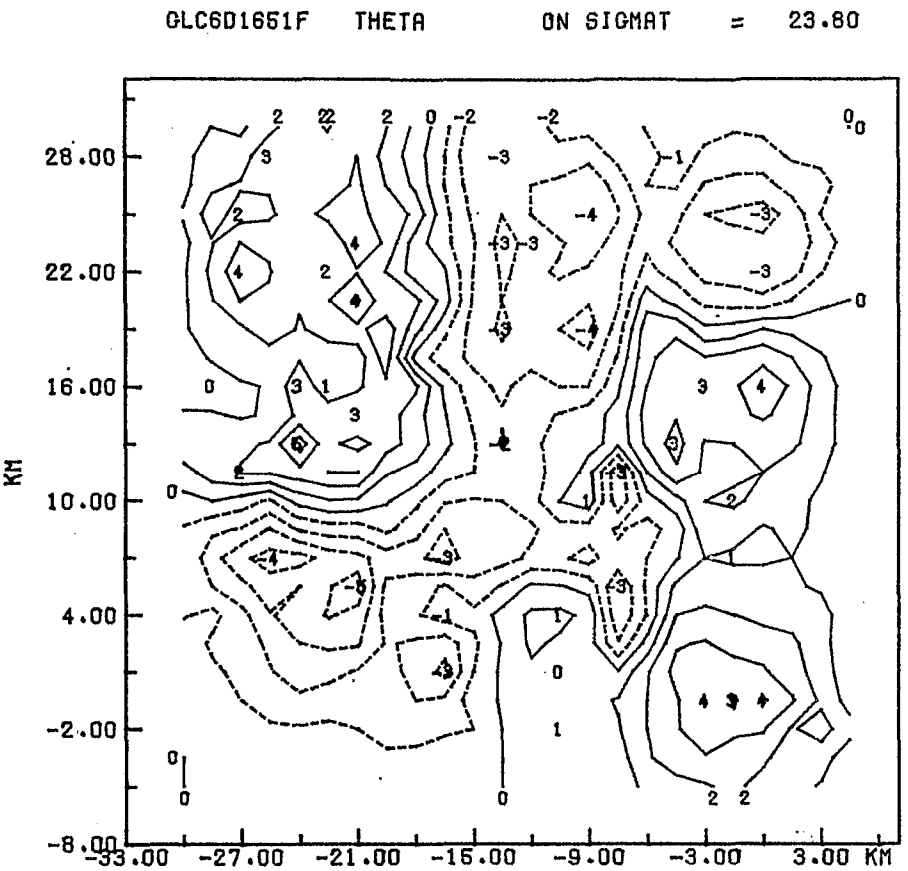

GLC6D1651F THETA ON SIGMAT = 23.70
KM
28.00
22.00
16.00
10.00
4.00
-2.00
-8.00
-33.00 -27.00 -21.00 -15.00 -9.00 -3.00 3.00 KM

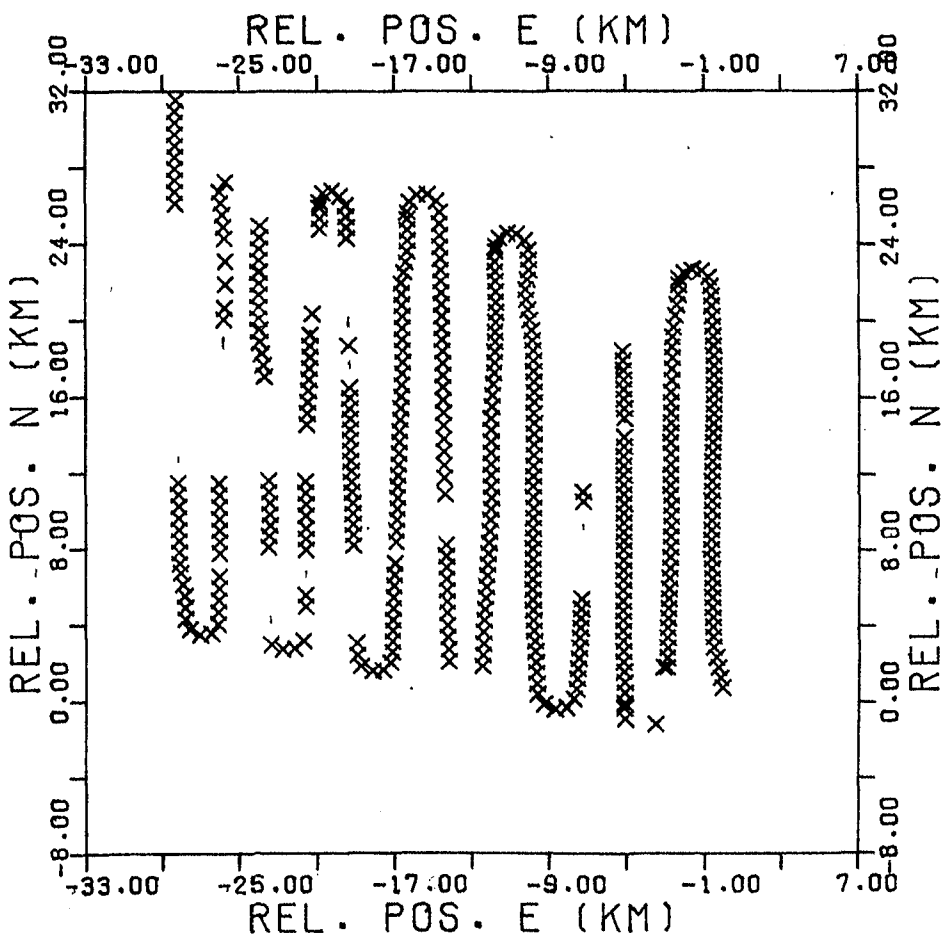

REL. POS. E (KM)
-33.00 -25.00 -17.00 -9.00 -1.00 7.00
REL. POS. N (KM)
32.00 24.00 16.00 8.00 0.00 -8.00



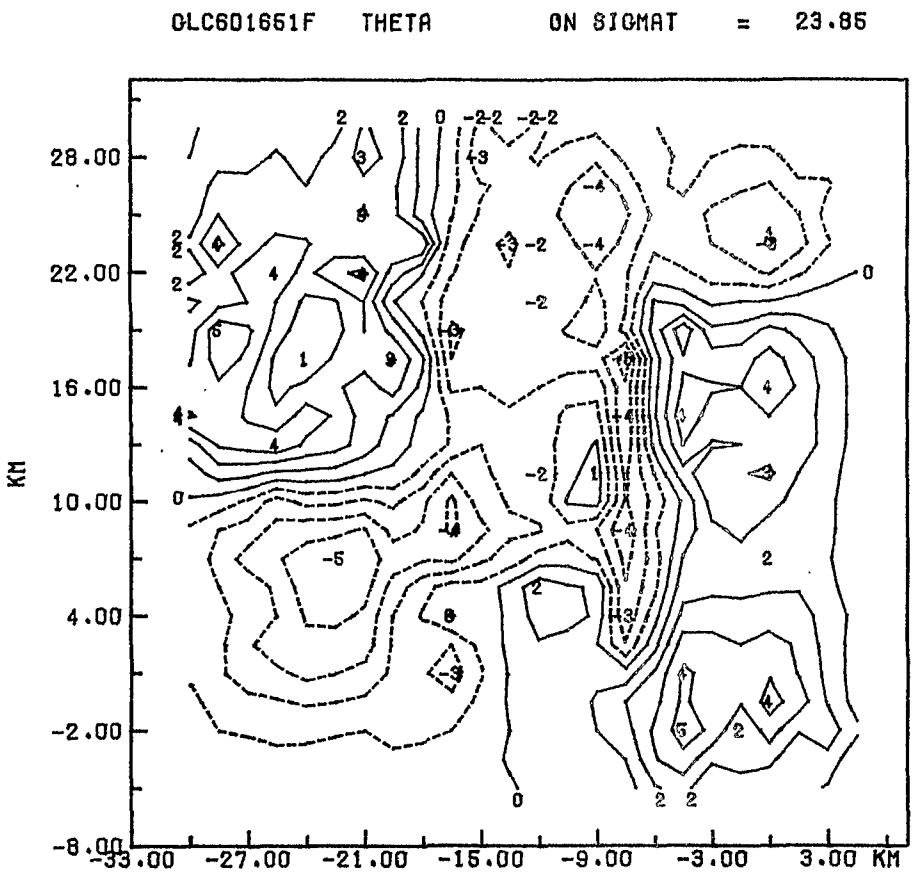


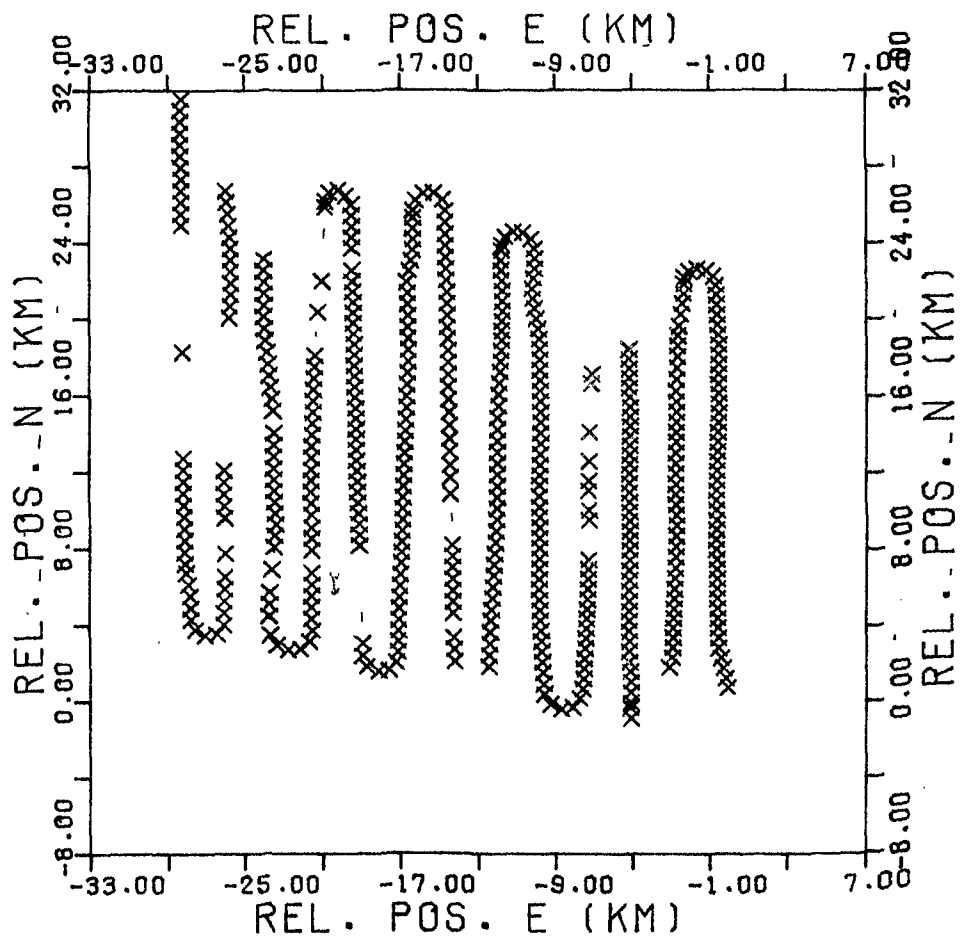
-Potential Temperature on Isopycnic Surfaces-



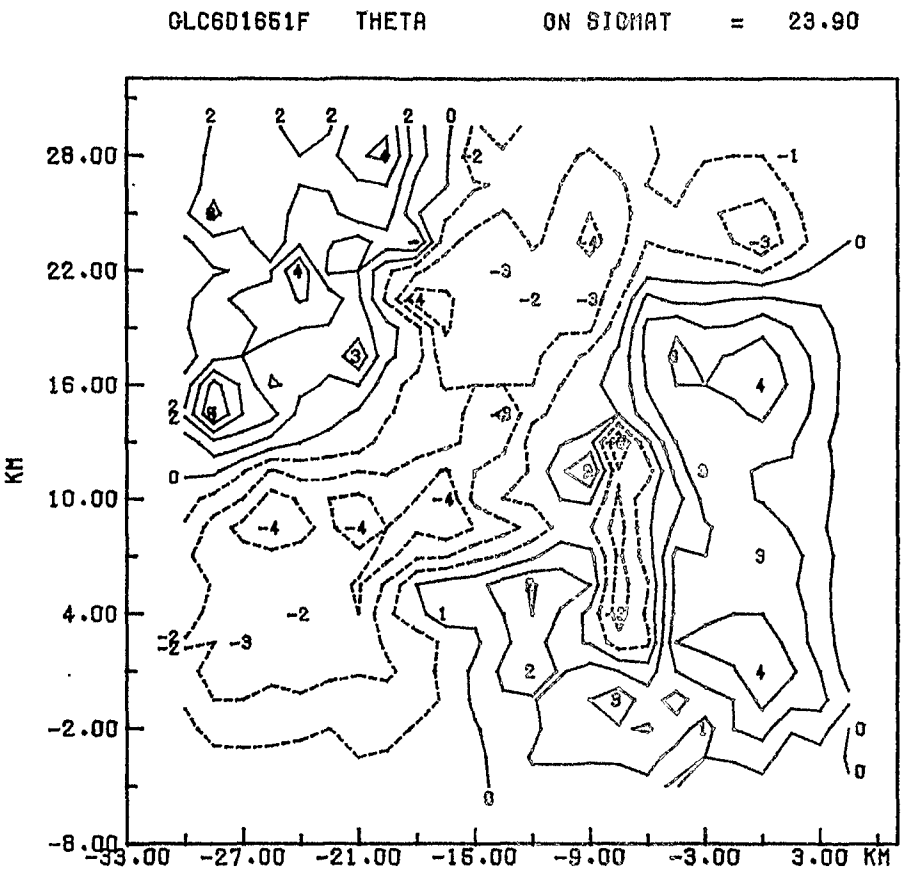


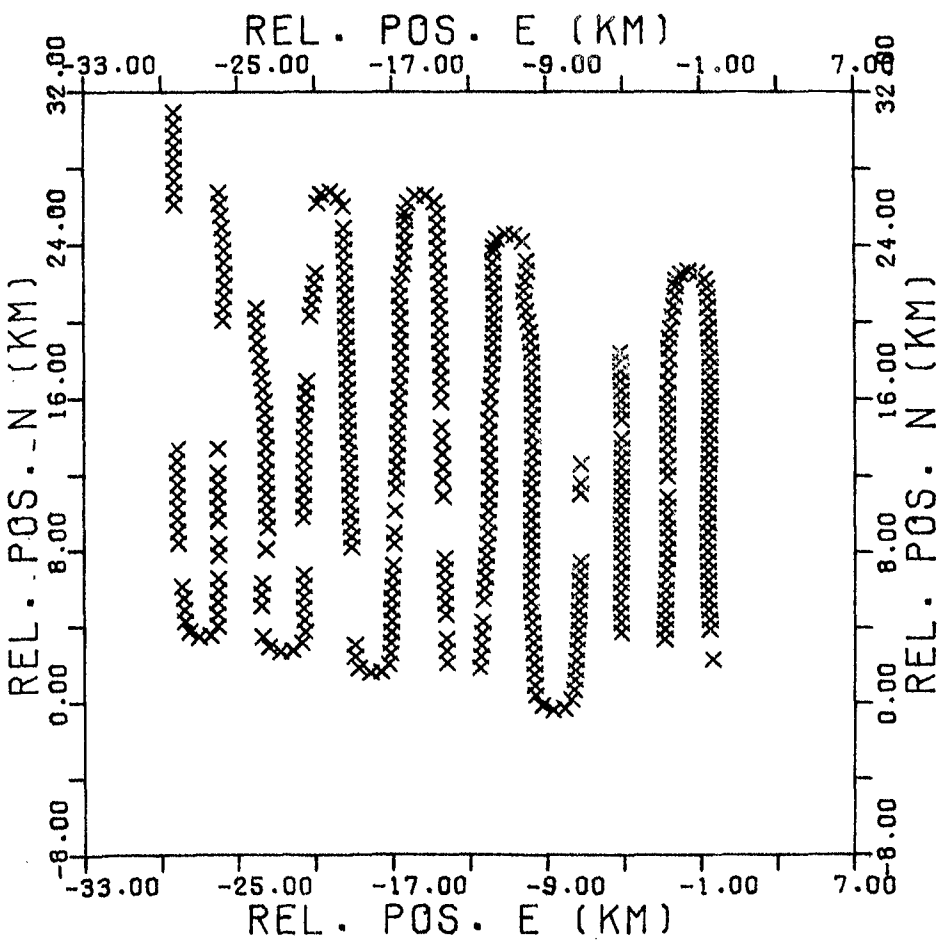
-Potential Temperature on Isopycnic Surfaces-



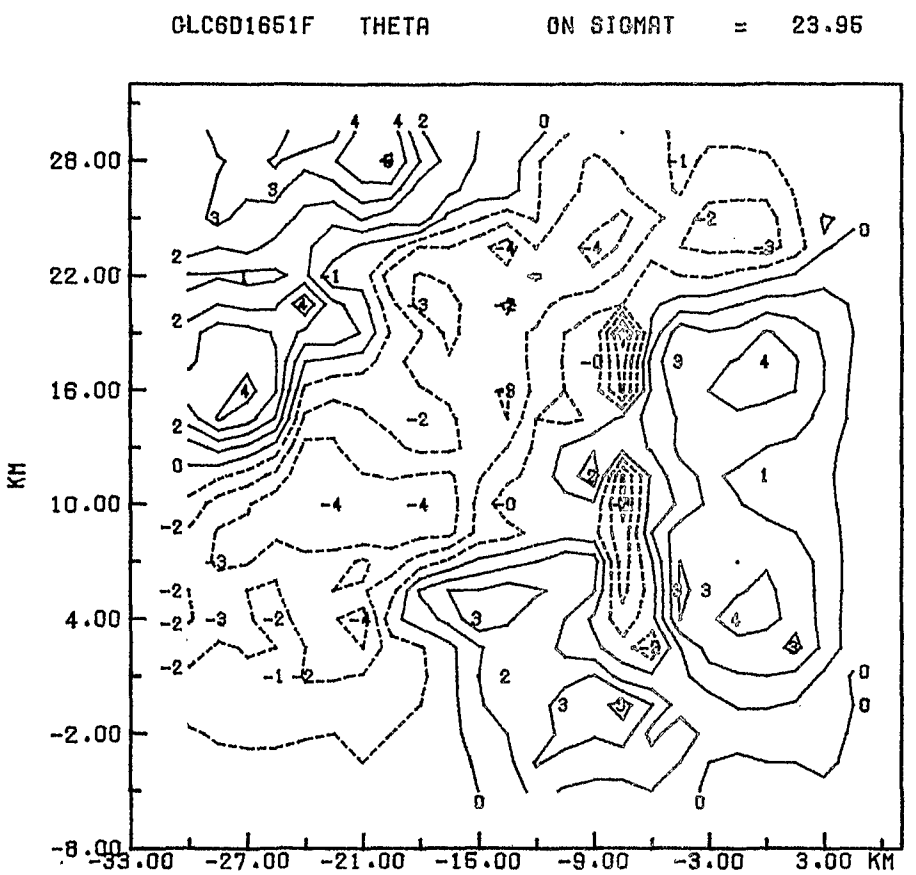


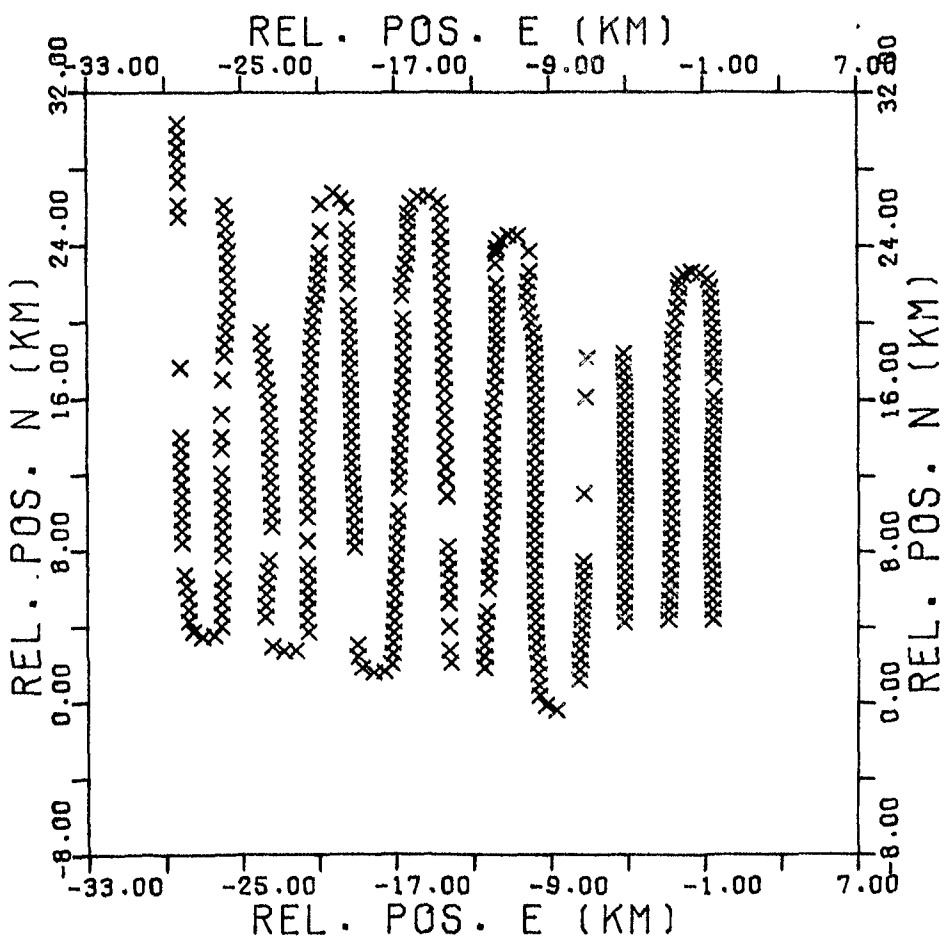
-Potential Temperature on Isopycnic Surfaces-



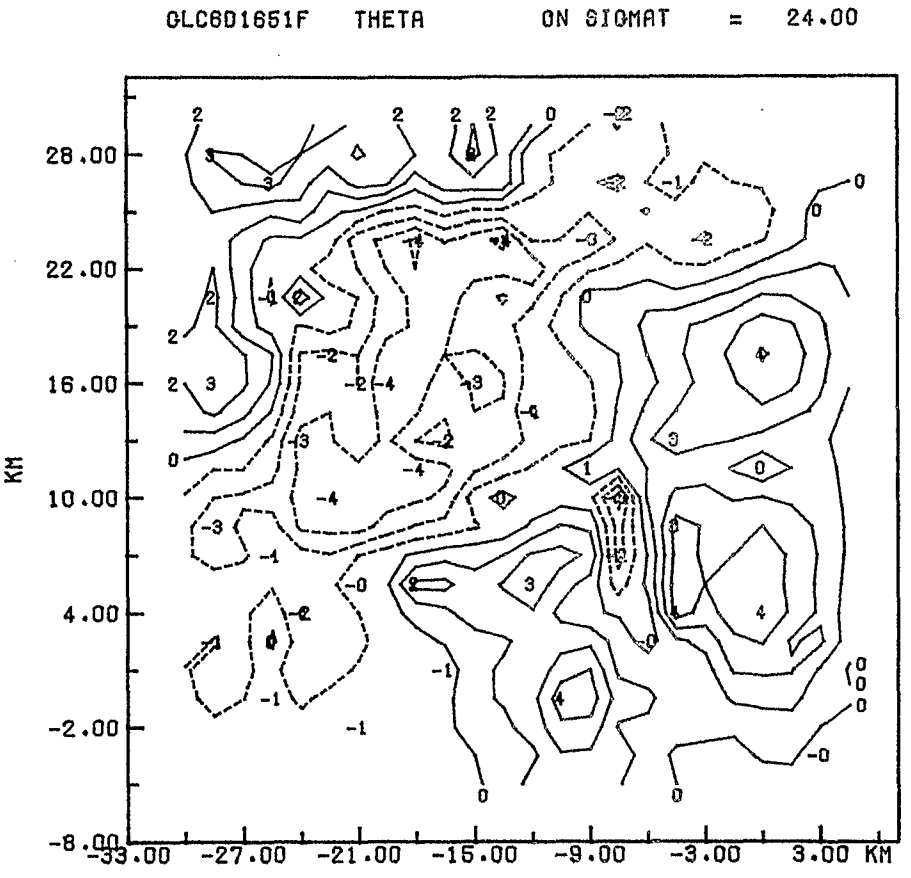


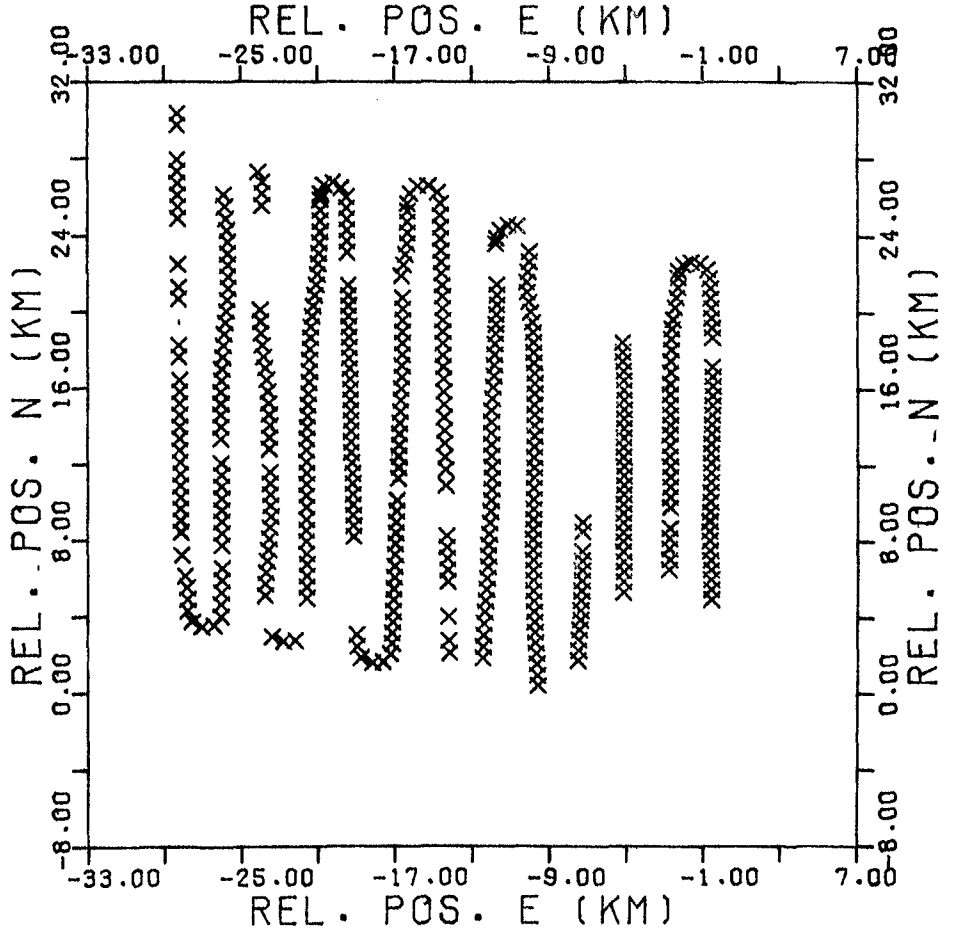
-Potential Temperature on Isopycnic Surfaces-

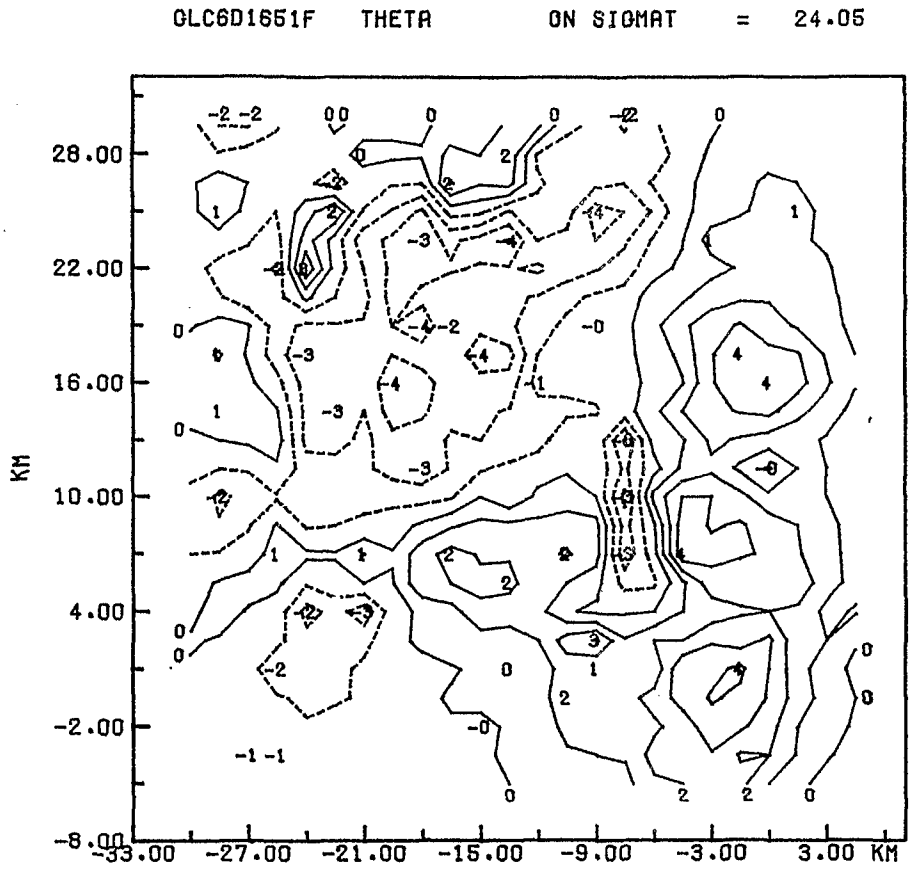


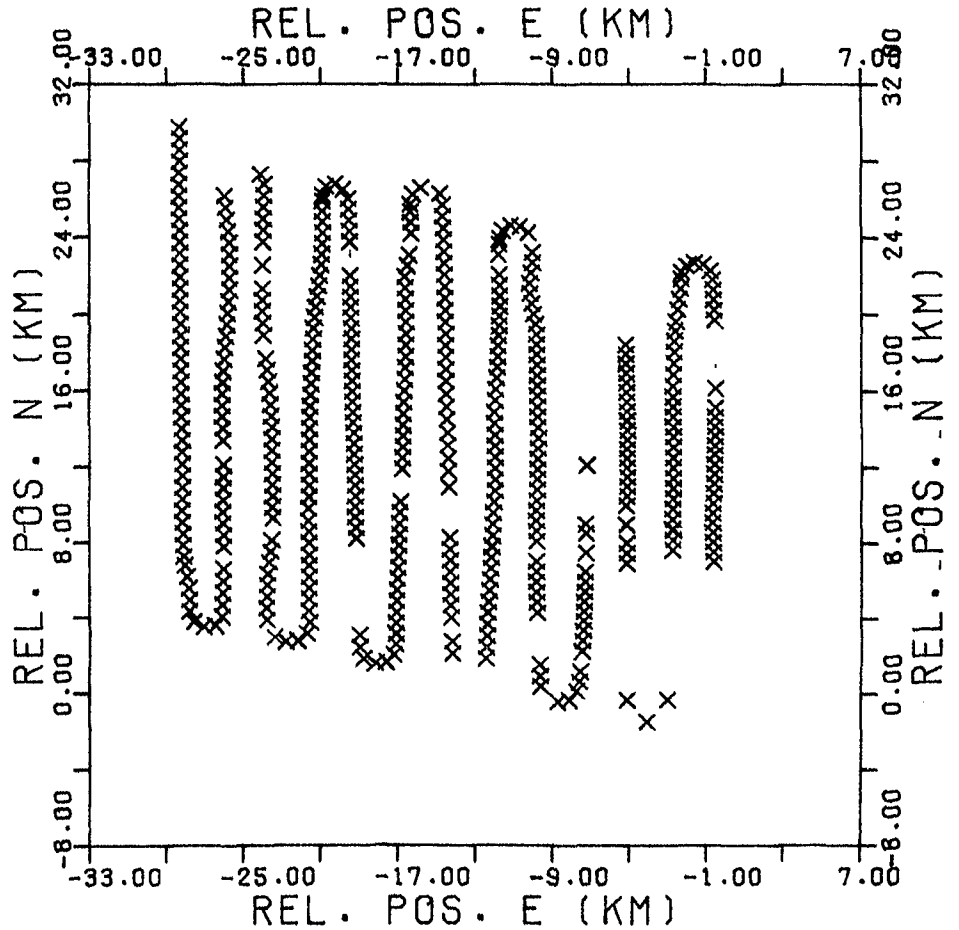


-Potential Temperature on Isopycnic Surfaces-

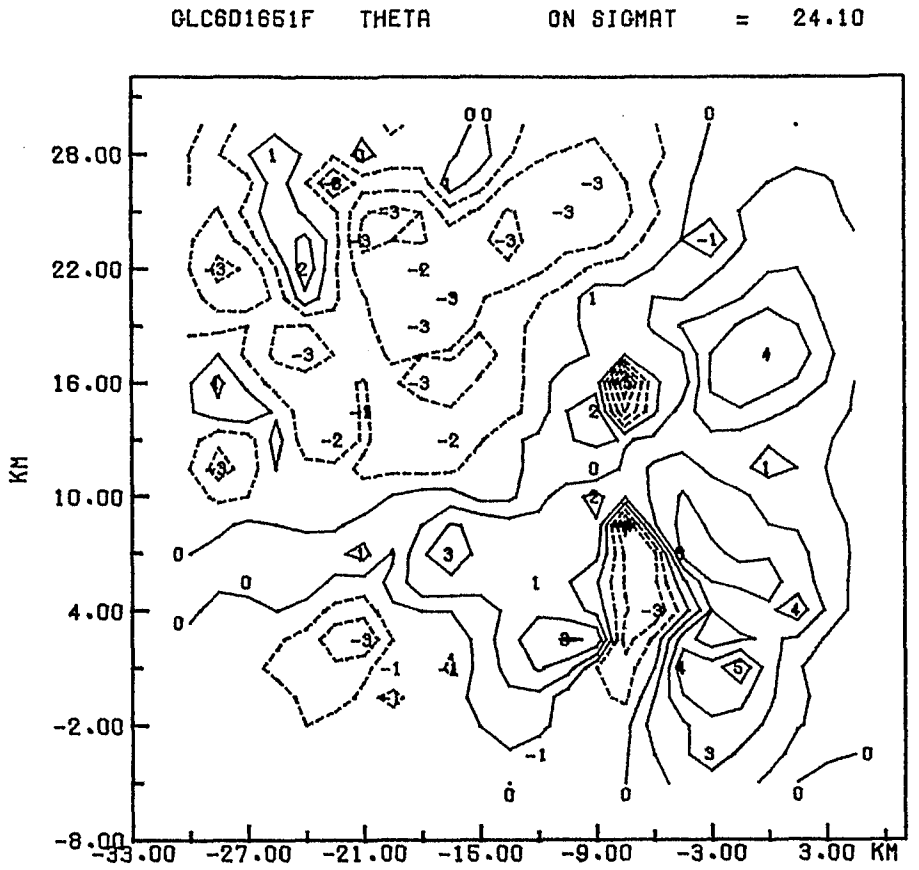

GLC6D1651F THETA ON SIGMAT = 24.00
KM
28.00
22.00
16.00
10.00
4.00
-2.00
-8.00
-33.00 -27.00 -21.00 -15.00 -9.00 -3.00 3.00 KM

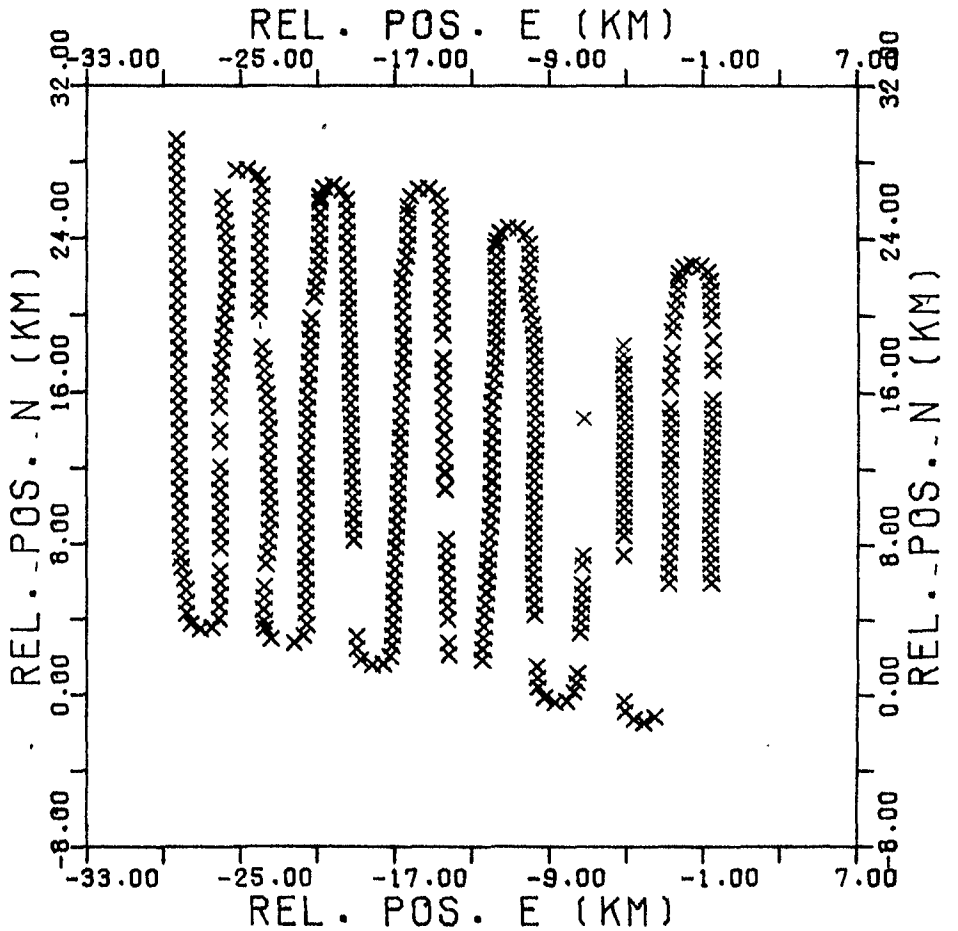

REL. POS. E (KM)
-33.00 -25.00 -17.00 -9.00 -1.00 7.00
REL. POS. N (KM)
32.00
24.00
16.00
8.00
0.00
-8.00



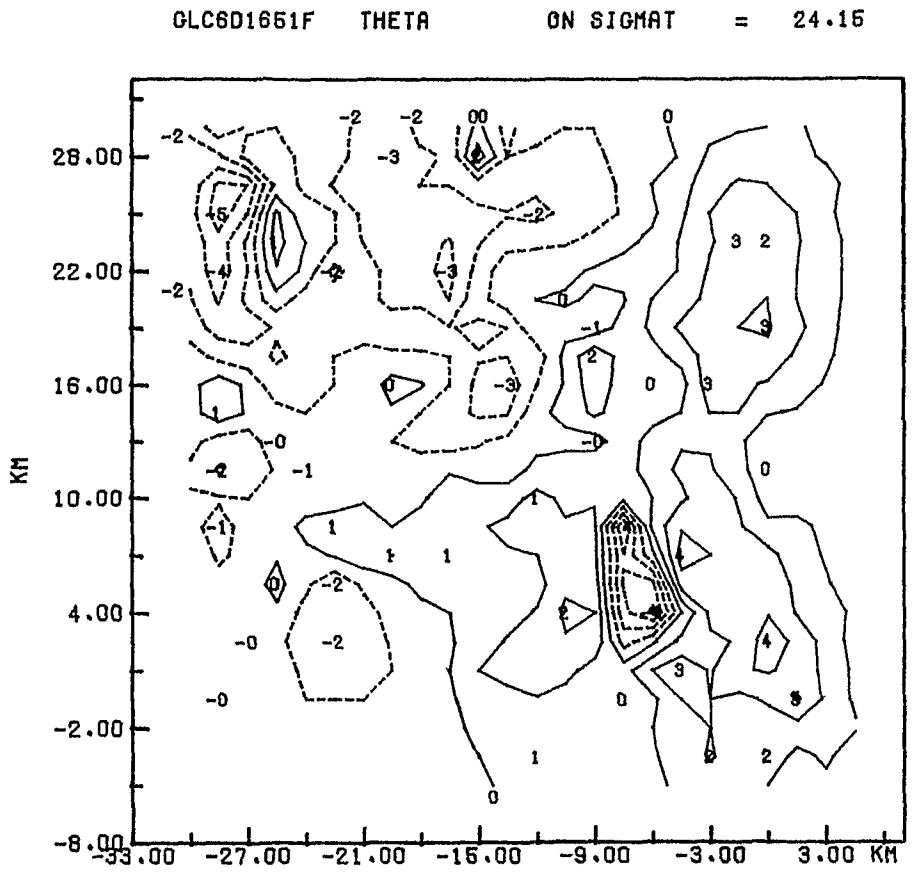


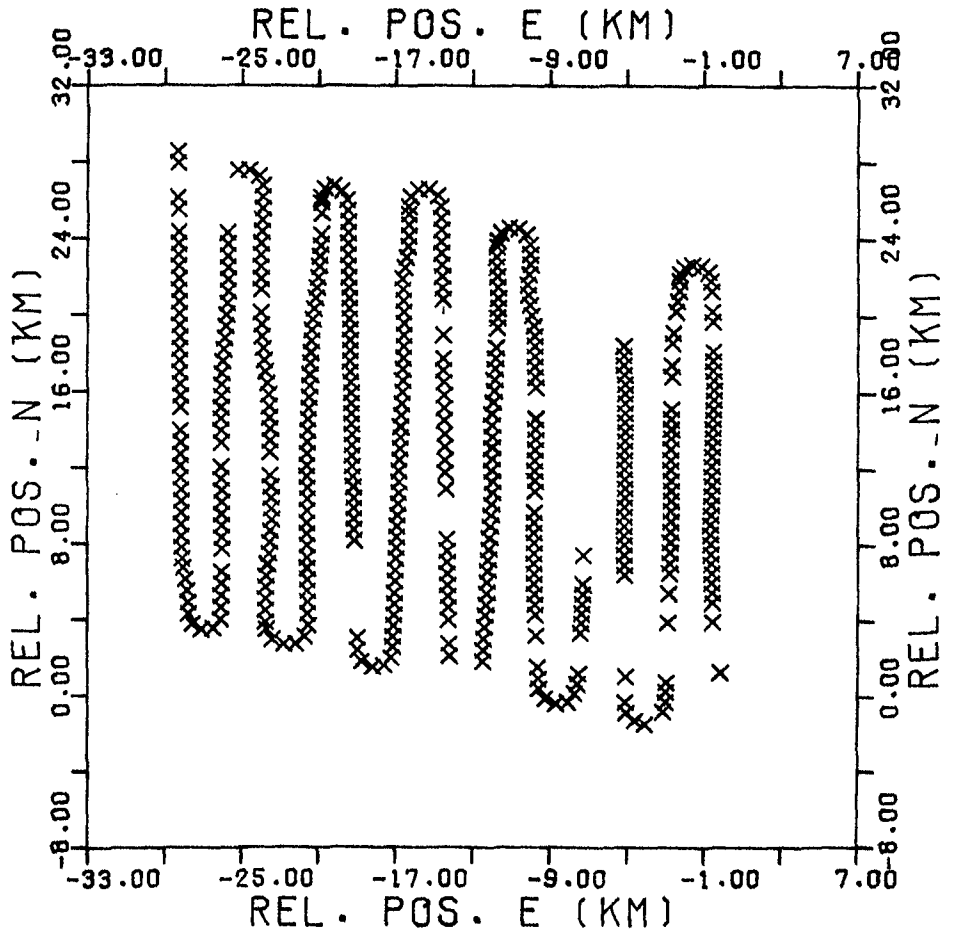
-Potential Temperature on Isopycnic Surfaces-



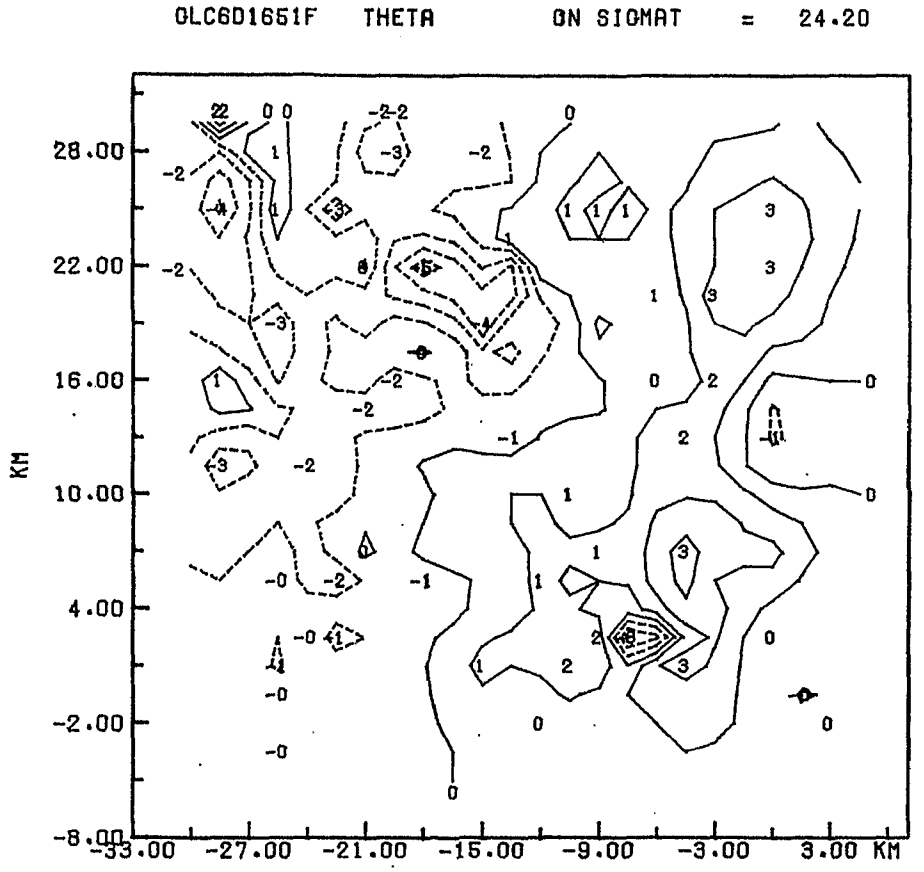


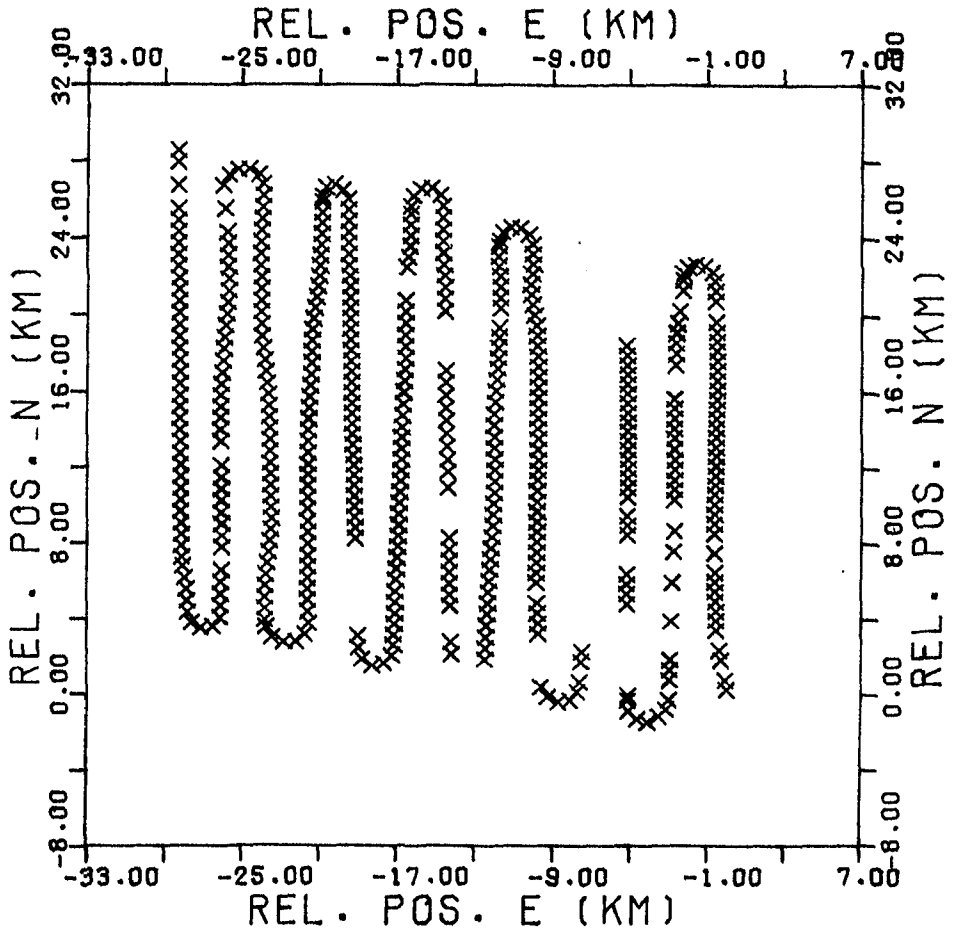
-Potential Temperature on Isopycnic Surfaces-



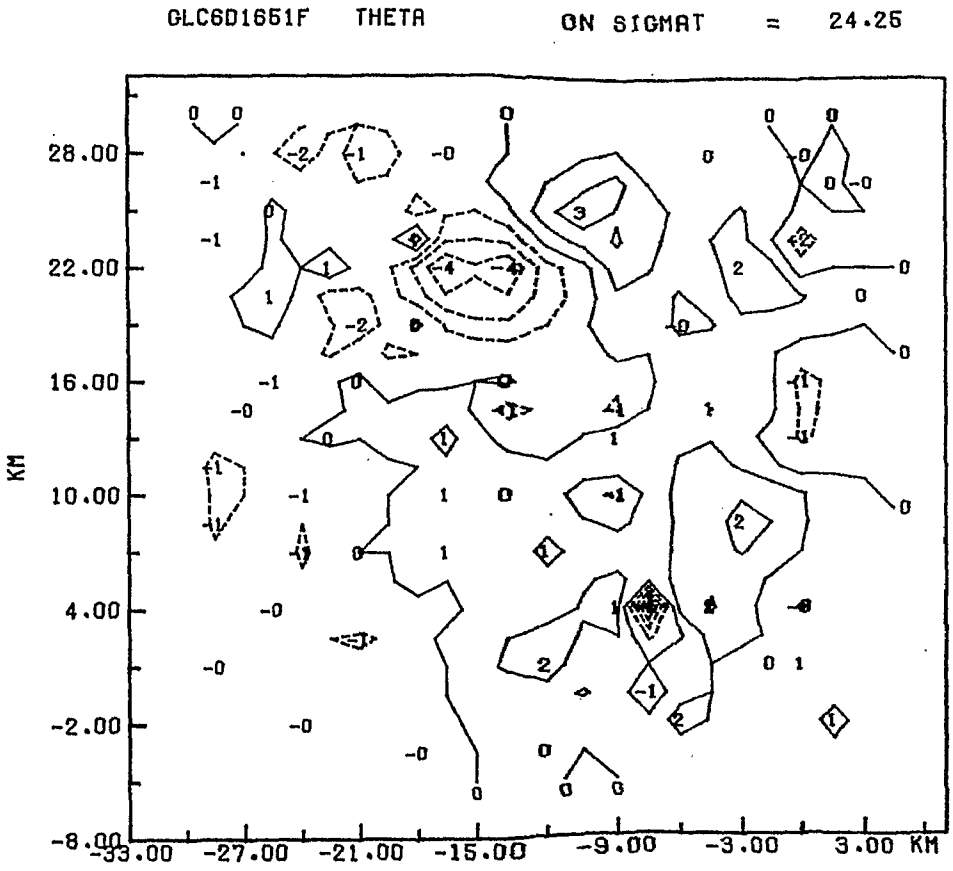


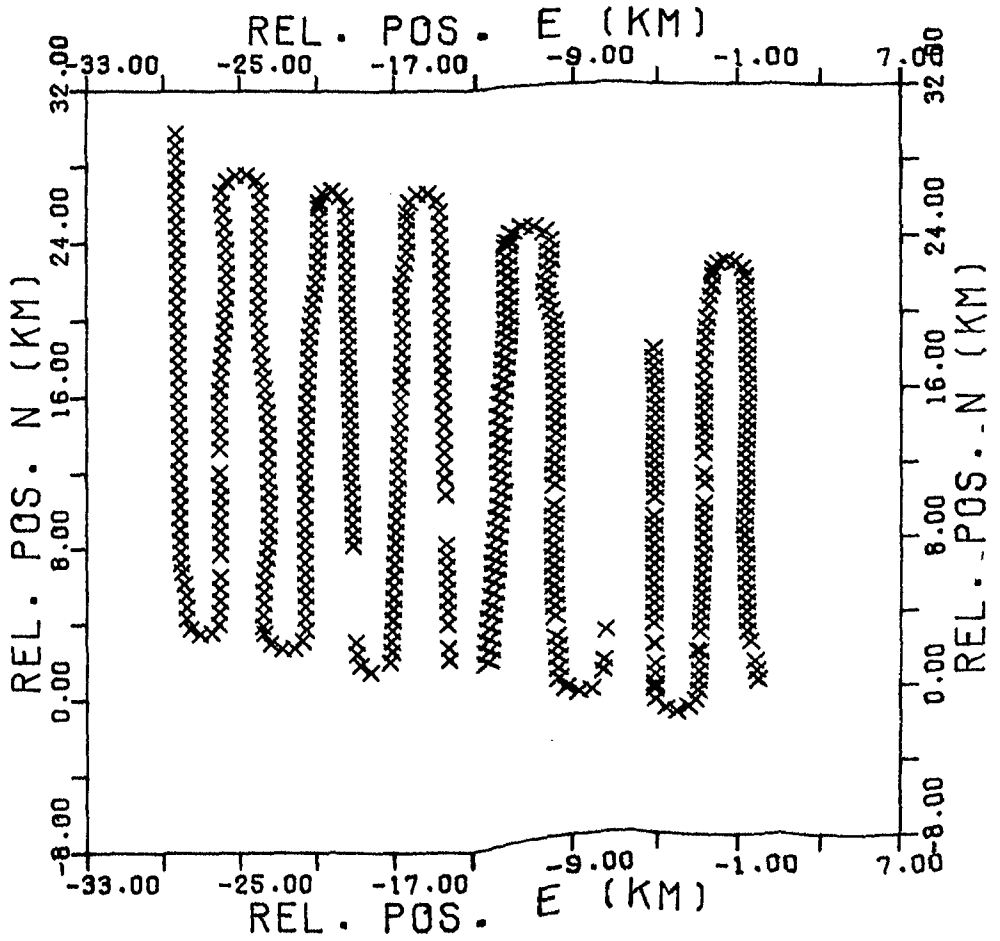
-Potential Temperature on Isopycnic Surfaces-



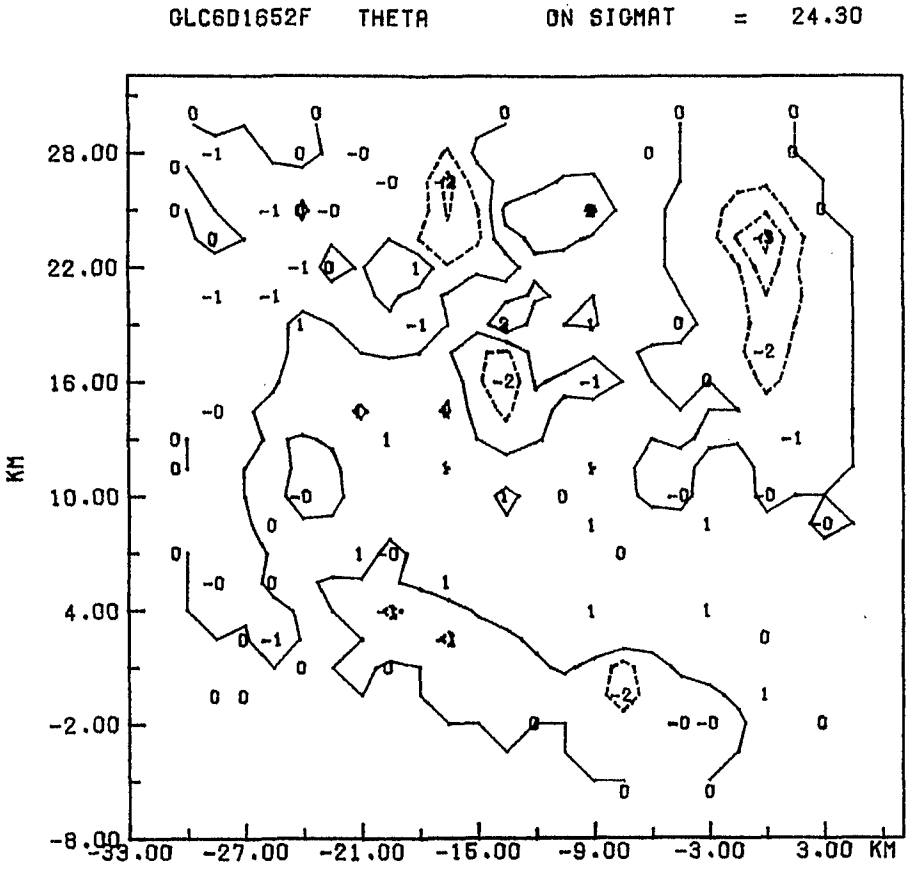


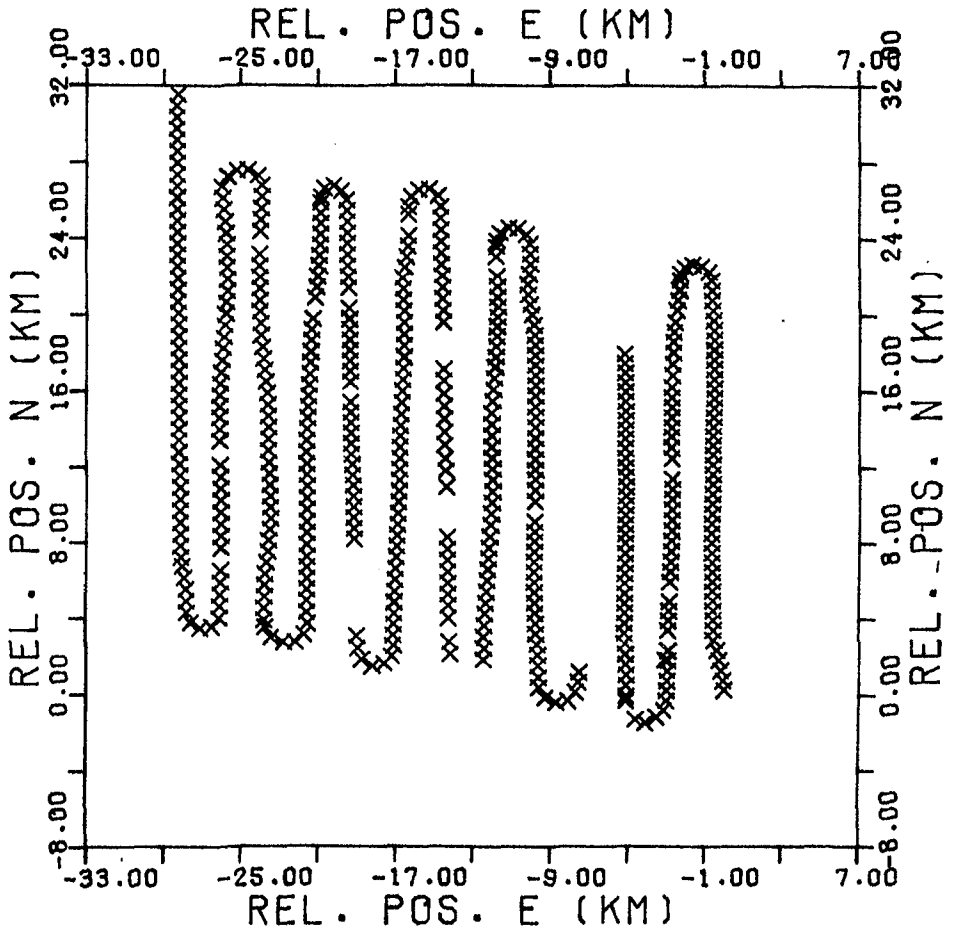
-Potential Temperature on Isopycnic Surfaces-



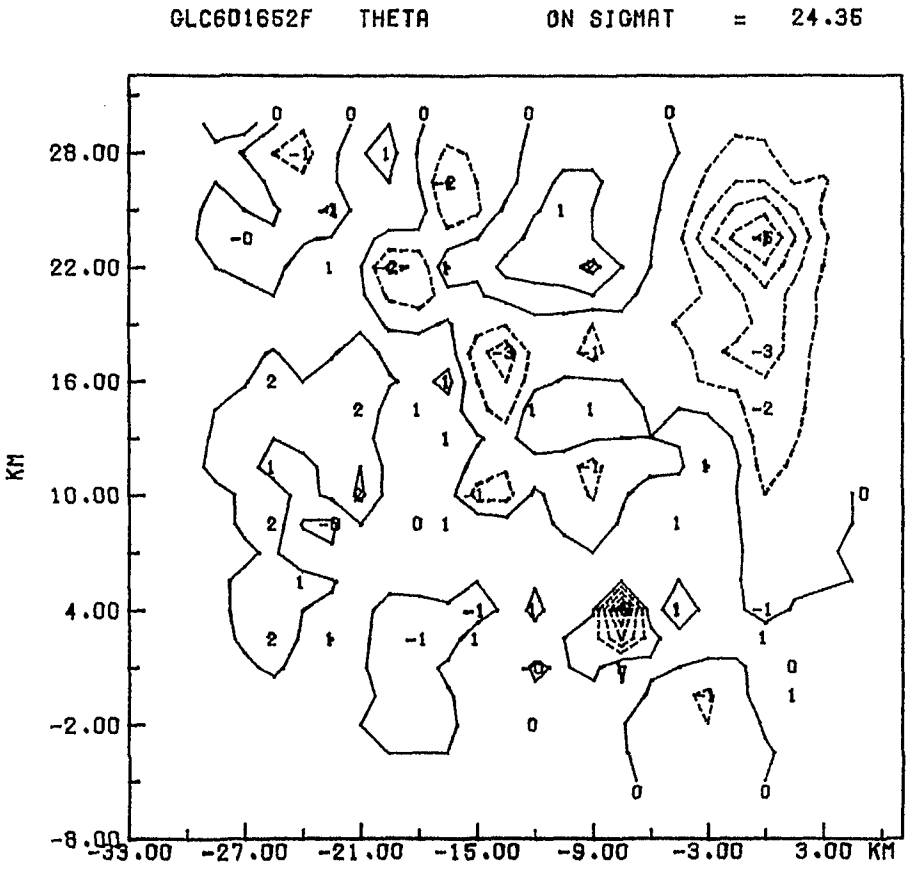


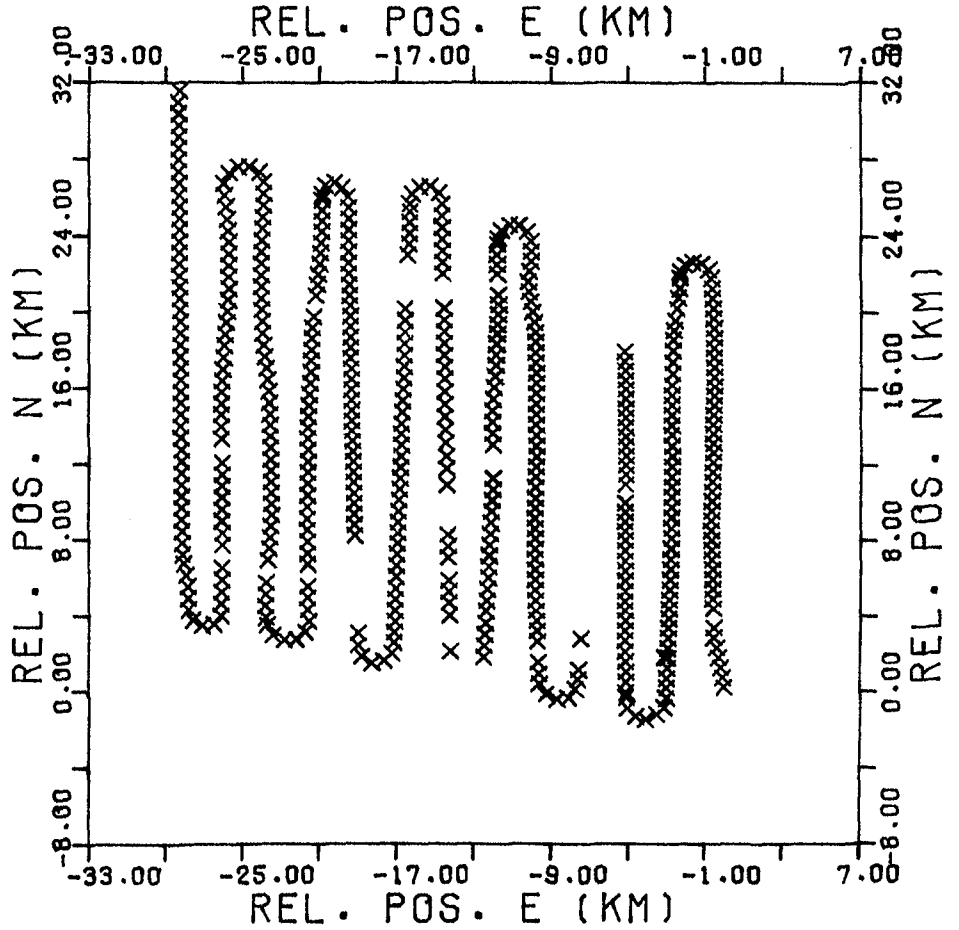
-Potential Temperature on Isopycnic Surfaces-



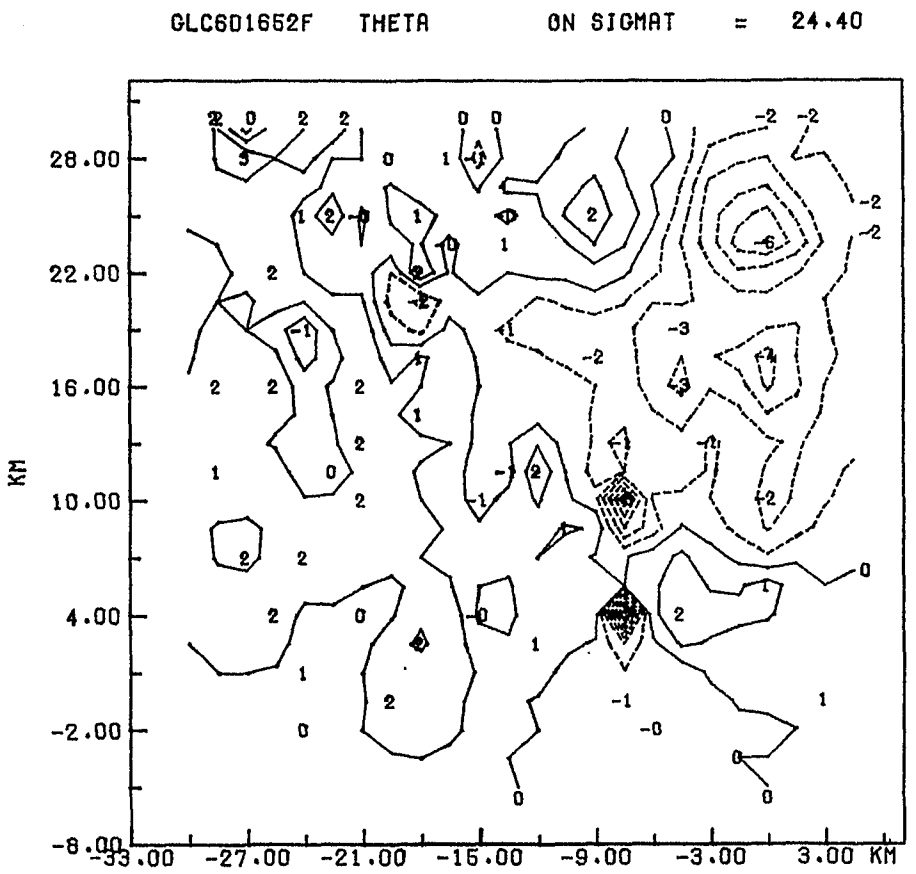


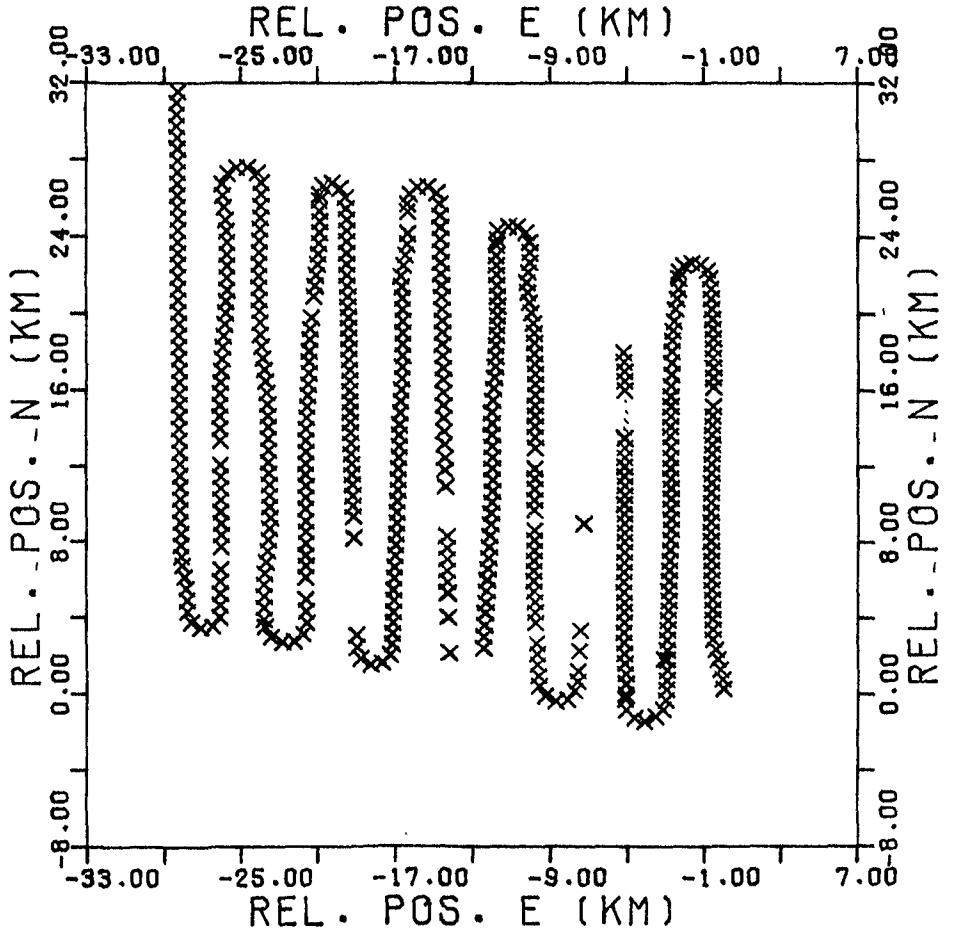
-Potential Temperature on Isopycnic Surfaces-



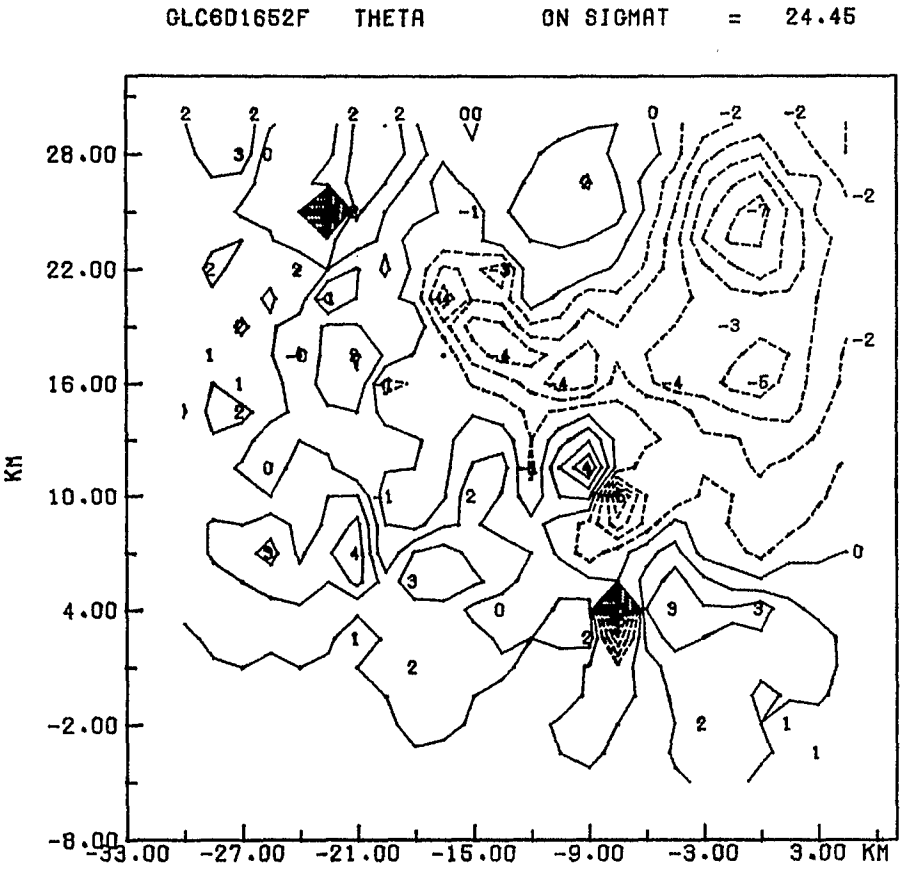


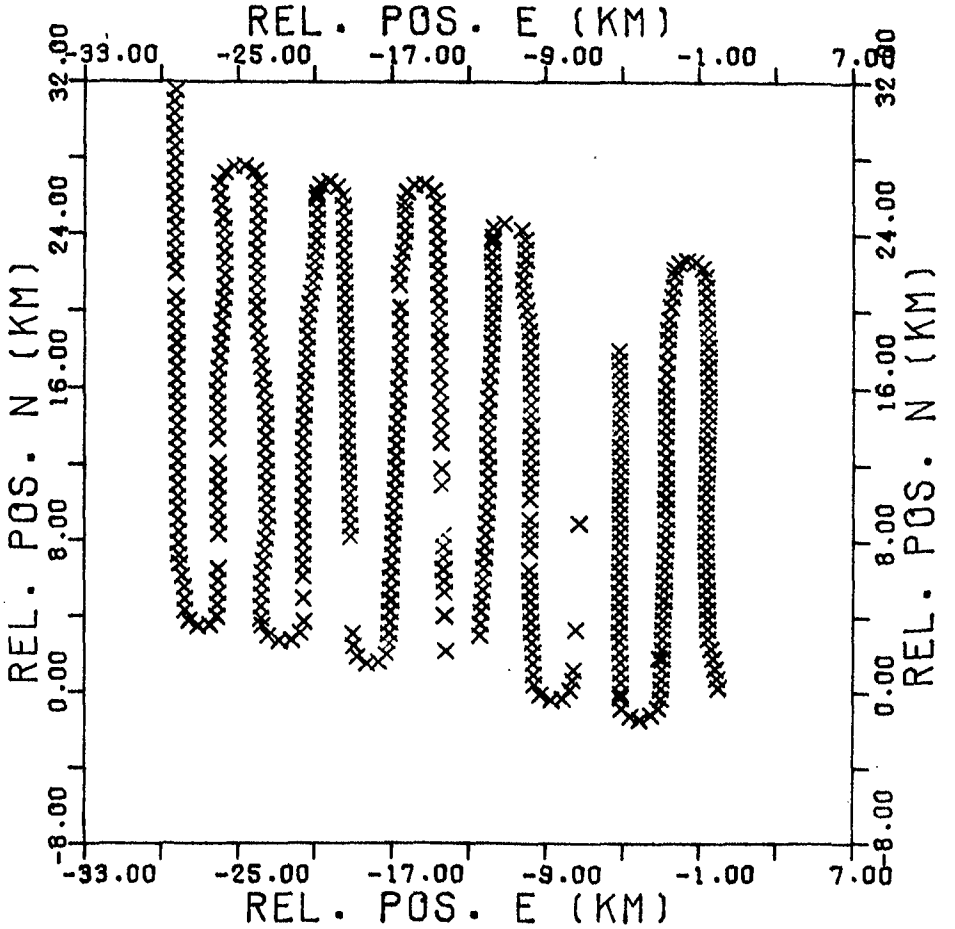
-Potential Temperature on Isopycnic Surfaces-



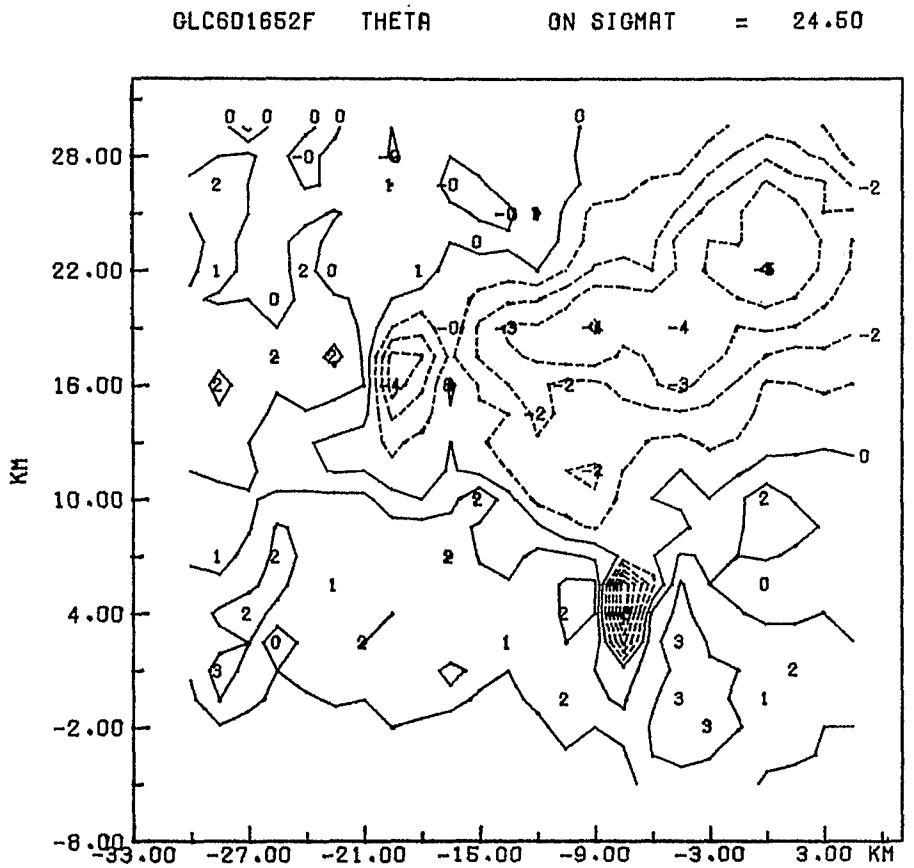


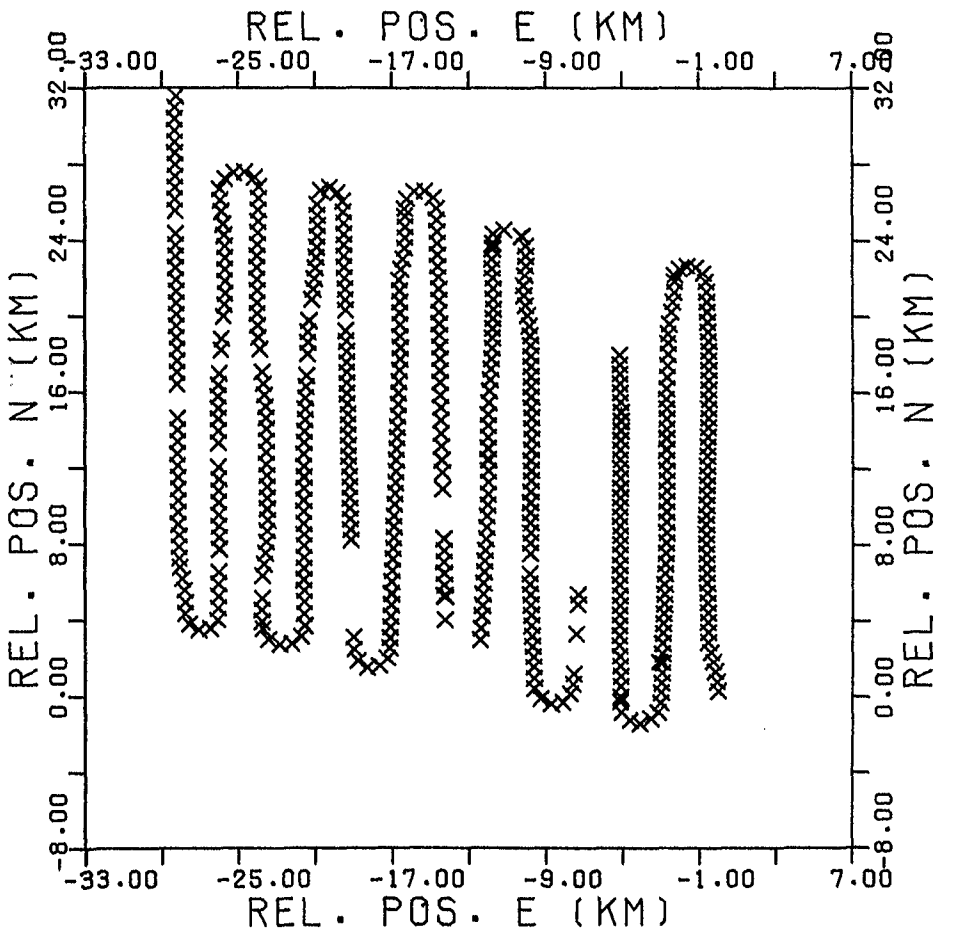
-Potential Temperature on Isopycnic Surfaces-



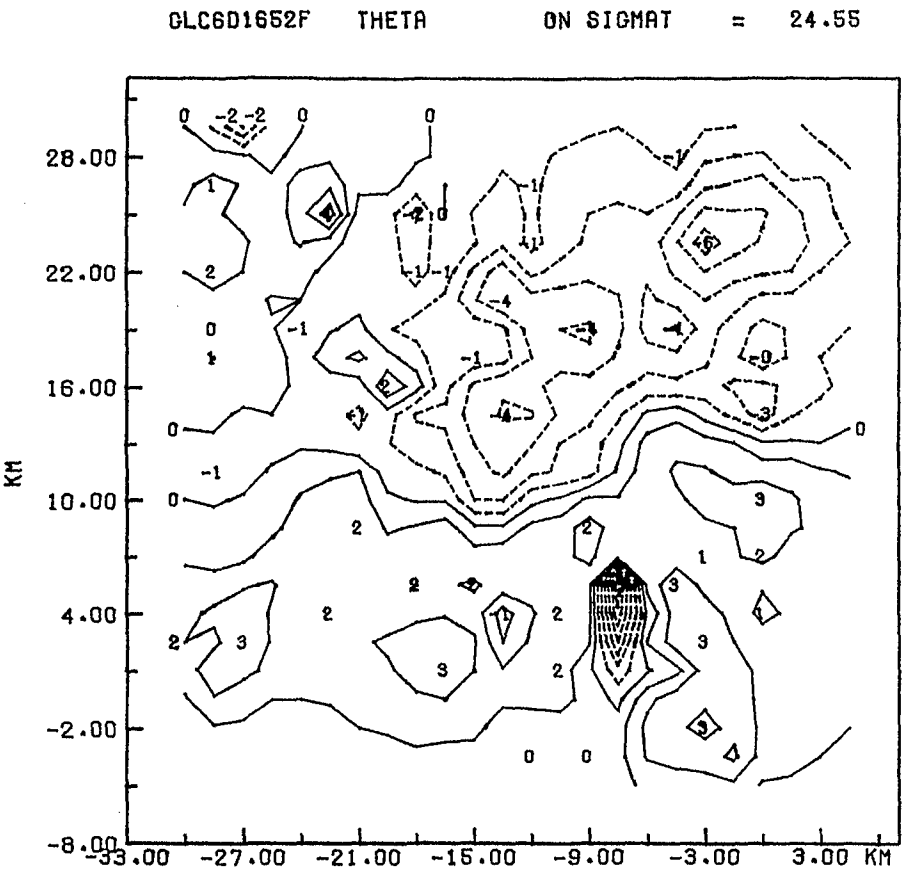


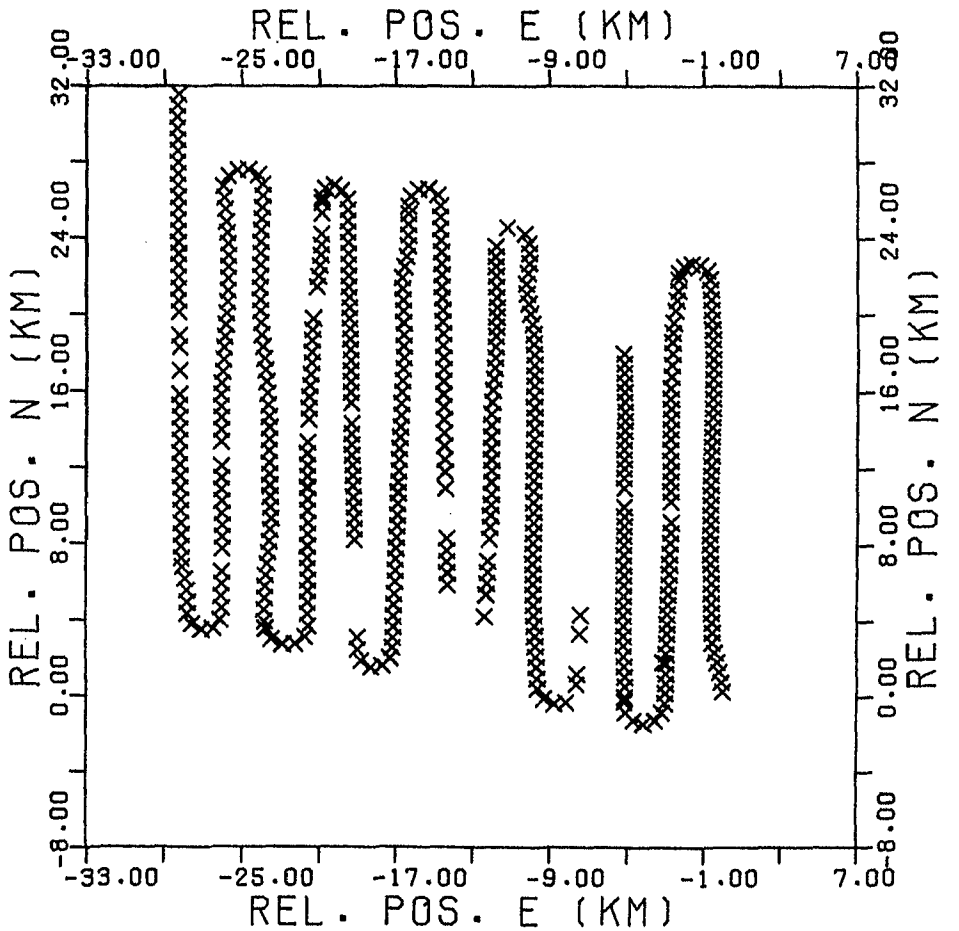
-Potential Temperature on Isopycnic Surfaces-



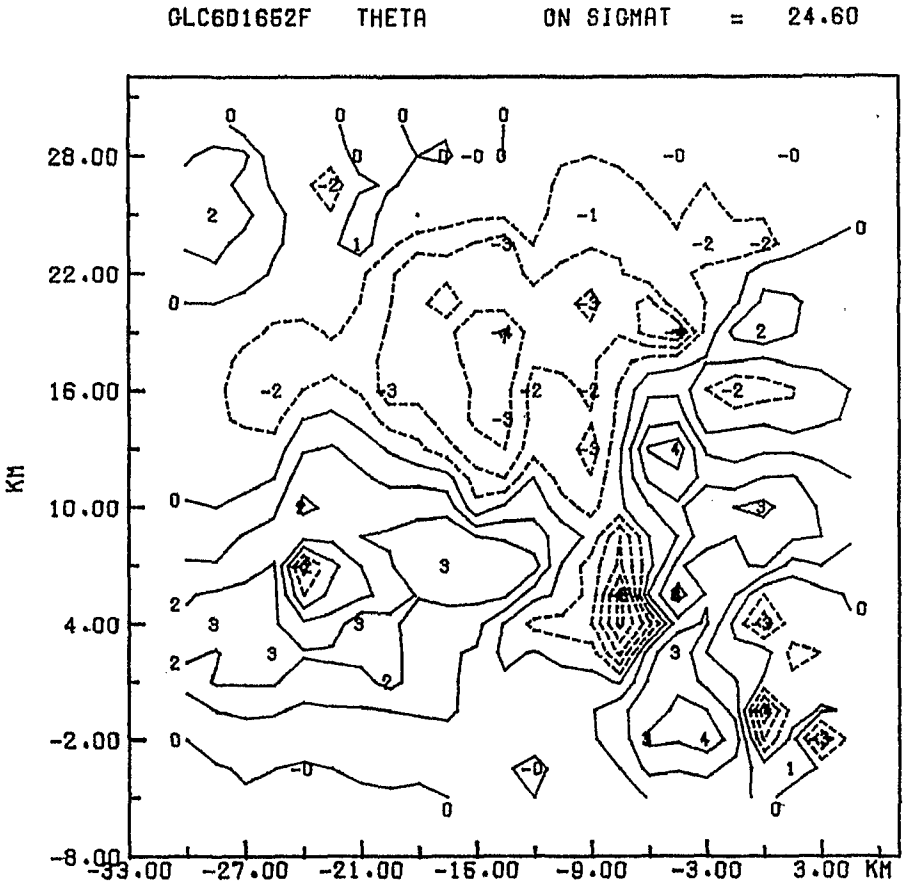


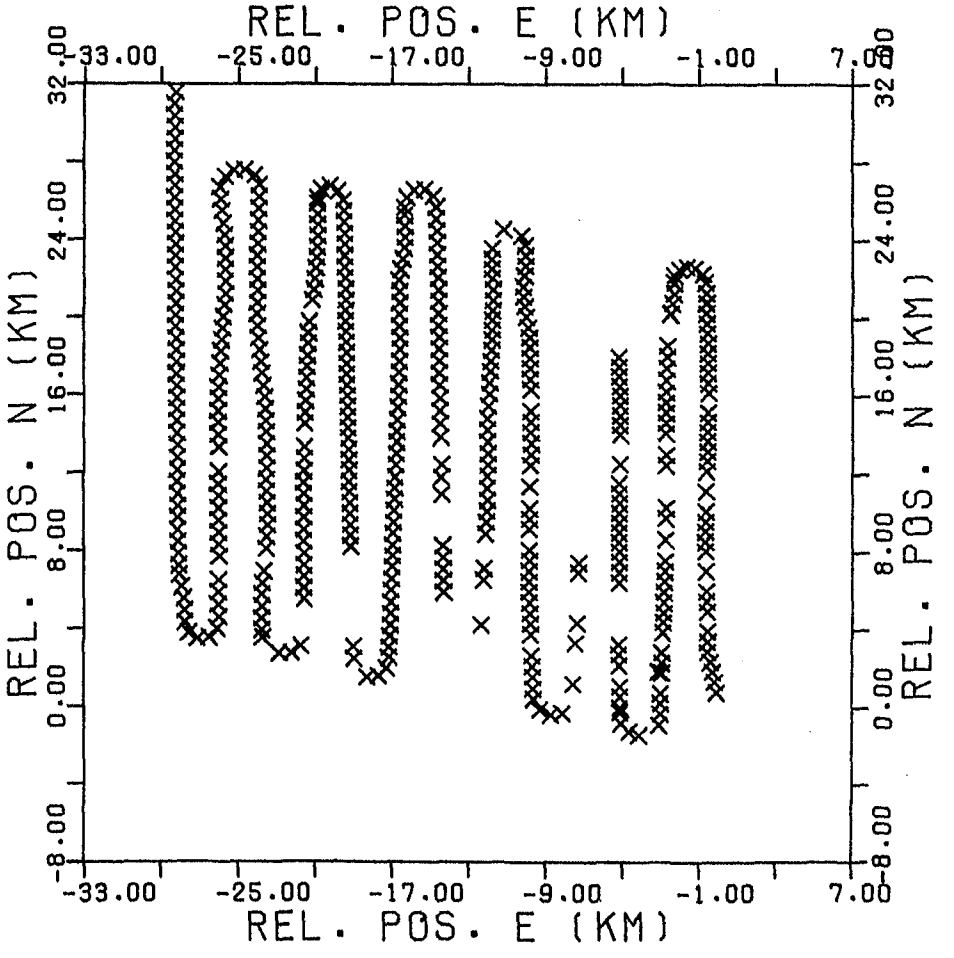
-Potential Temperature on Isopycnic Surfaces-

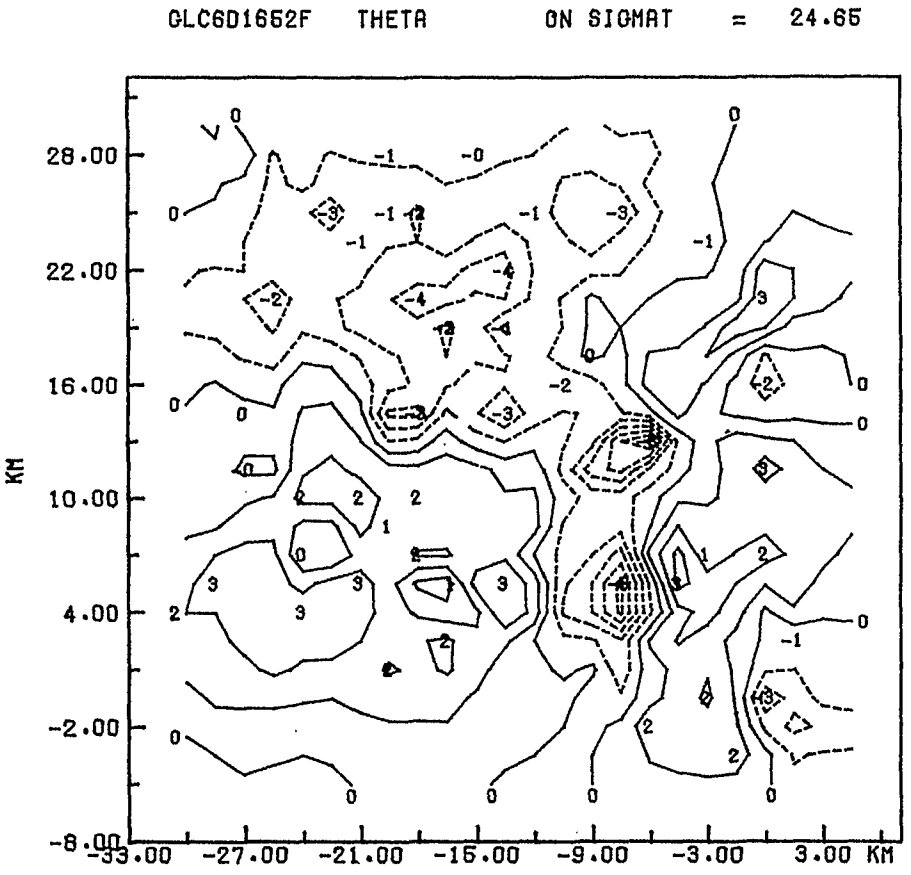


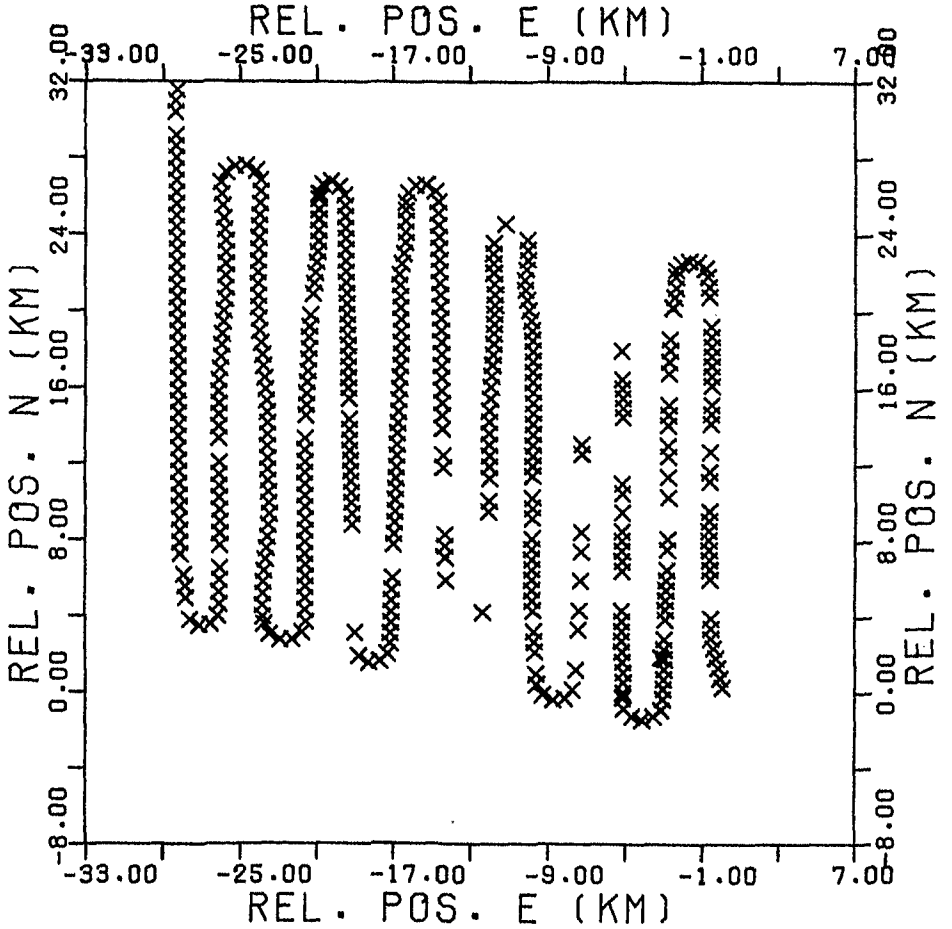


-Potential Temperature on Isopycnic Surfaces-

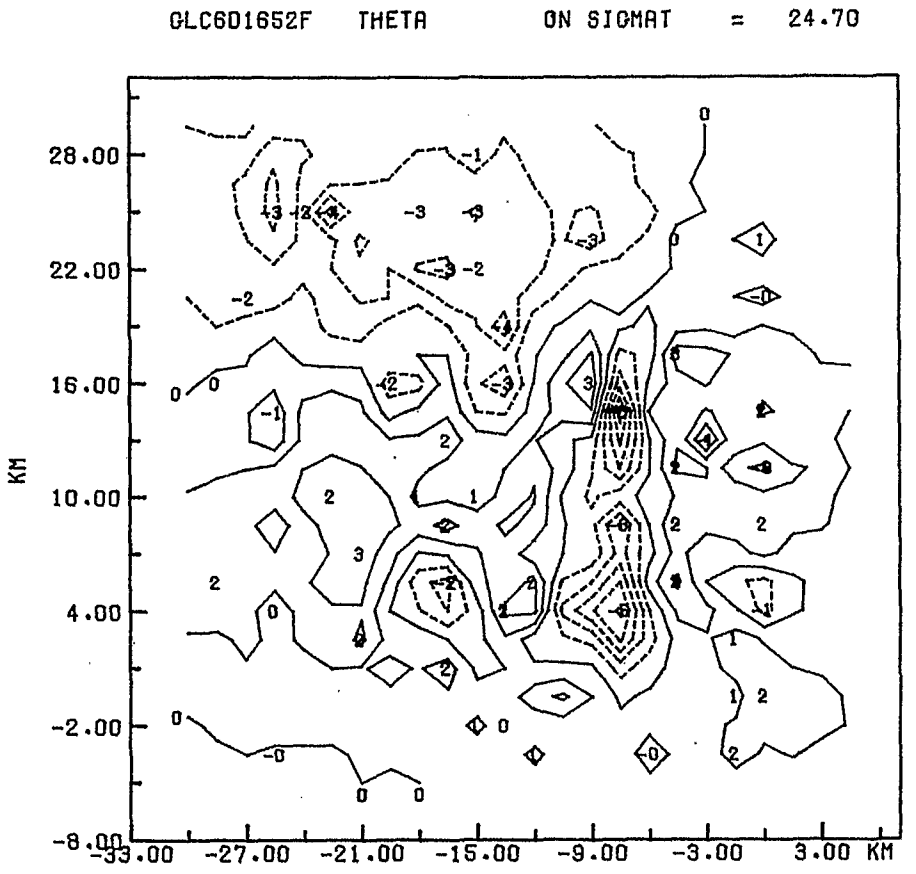

GLC6D1652F THETA ON SIGMAT = 24.60
KM
28.00
22.00
16.00
10.00
4.00
-2.00
-8.00
-33.00
-27.00
-21.00
-15.00
-9.00
-3.00
3.00 KM

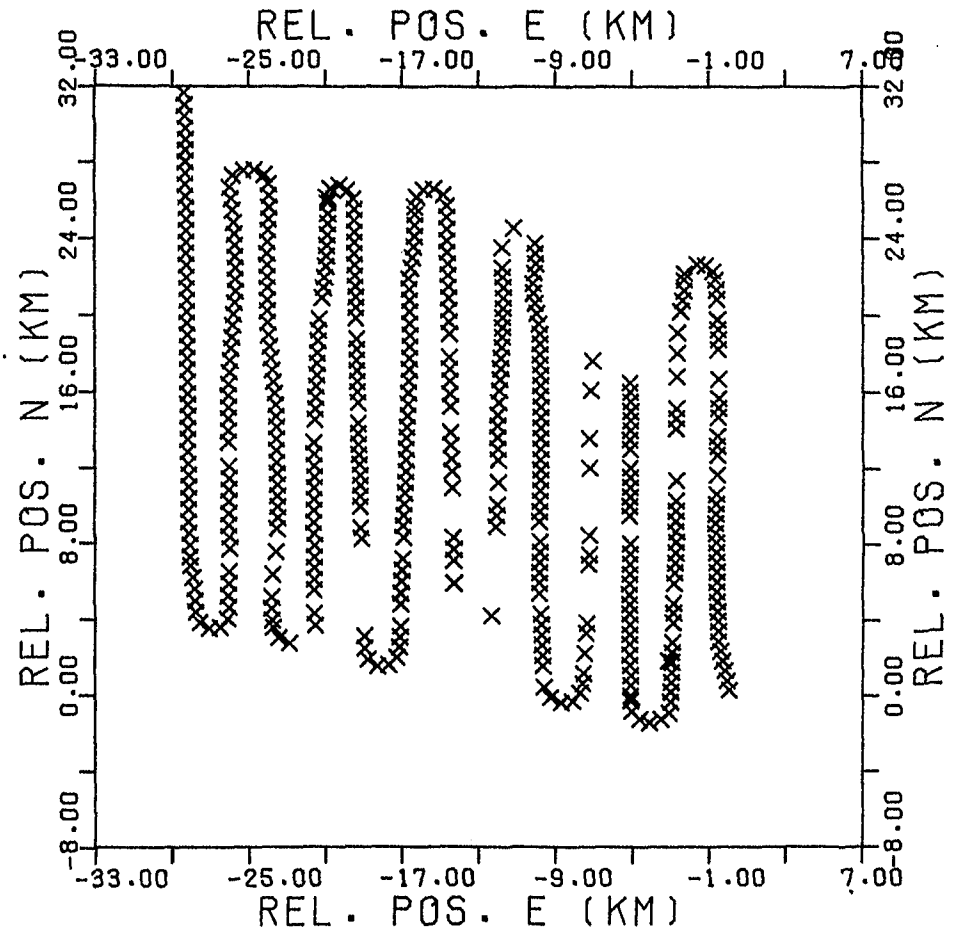

REL. POS. E (KM)
-33.00
-25.00
-17.00
-9.00
-1.00
7.00
REL. POS. N (KM)
32.00
24.00
16.00
8.00
0.00
-8.00

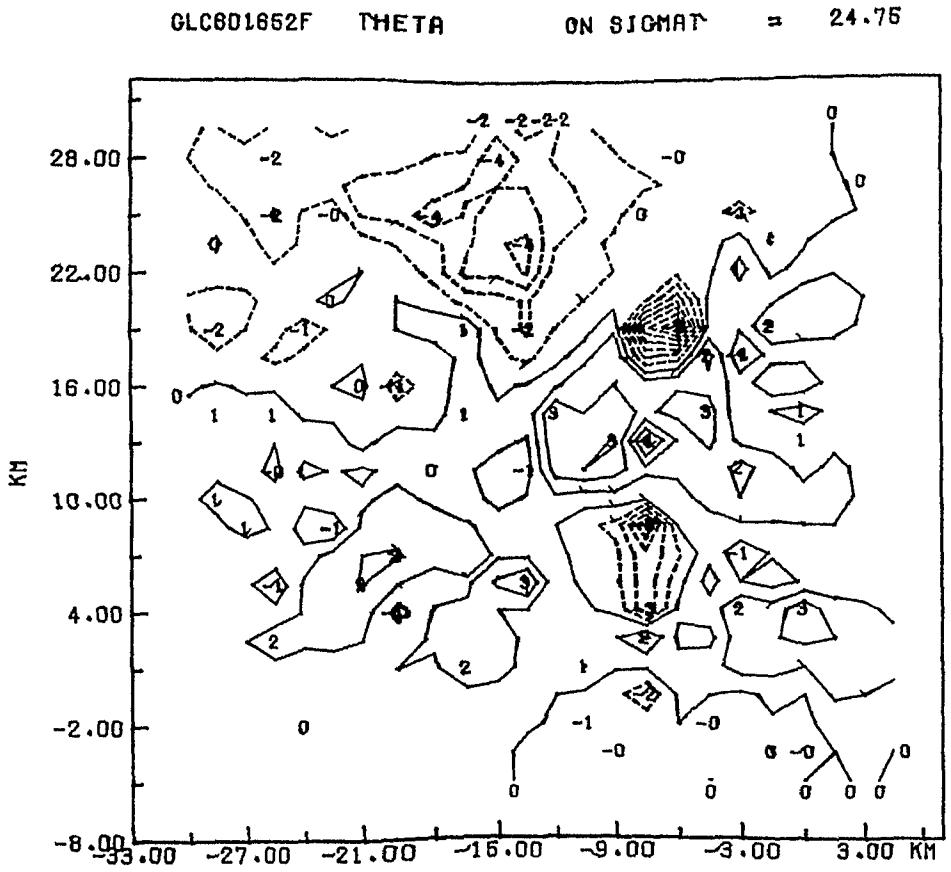


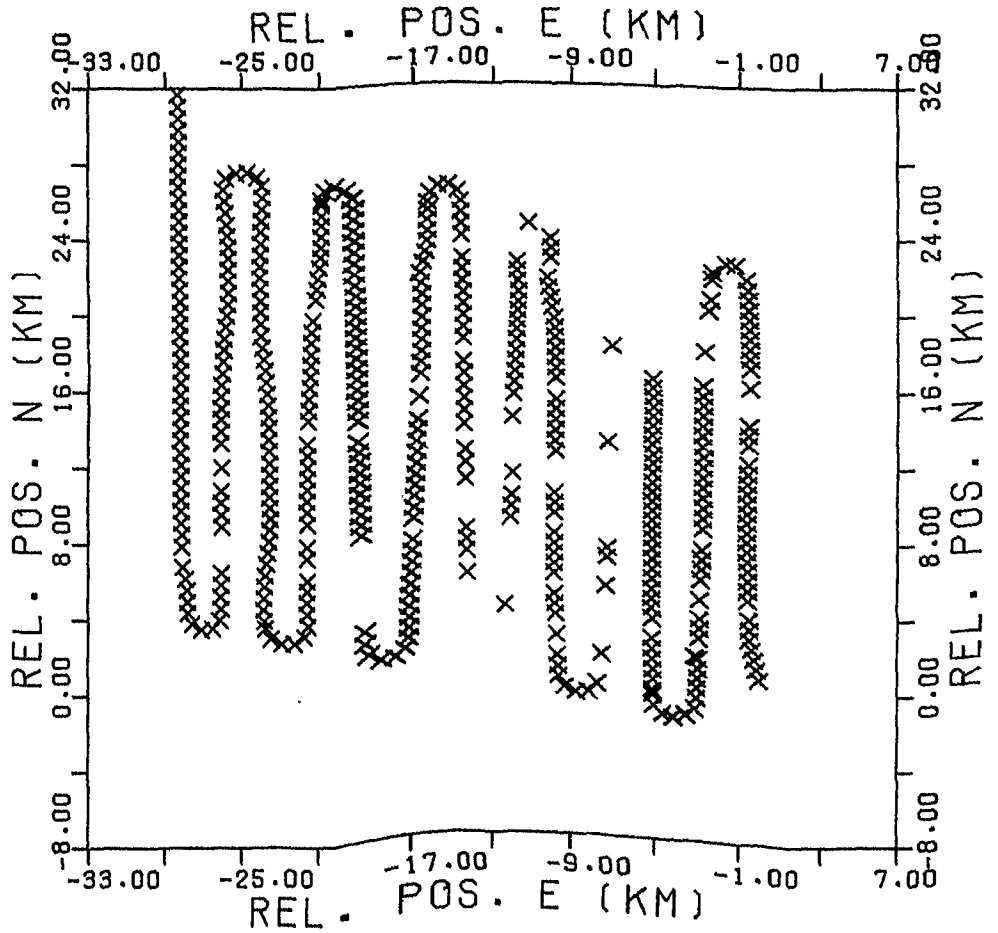


-Potential Temperature on Isopycnic Surfaces-

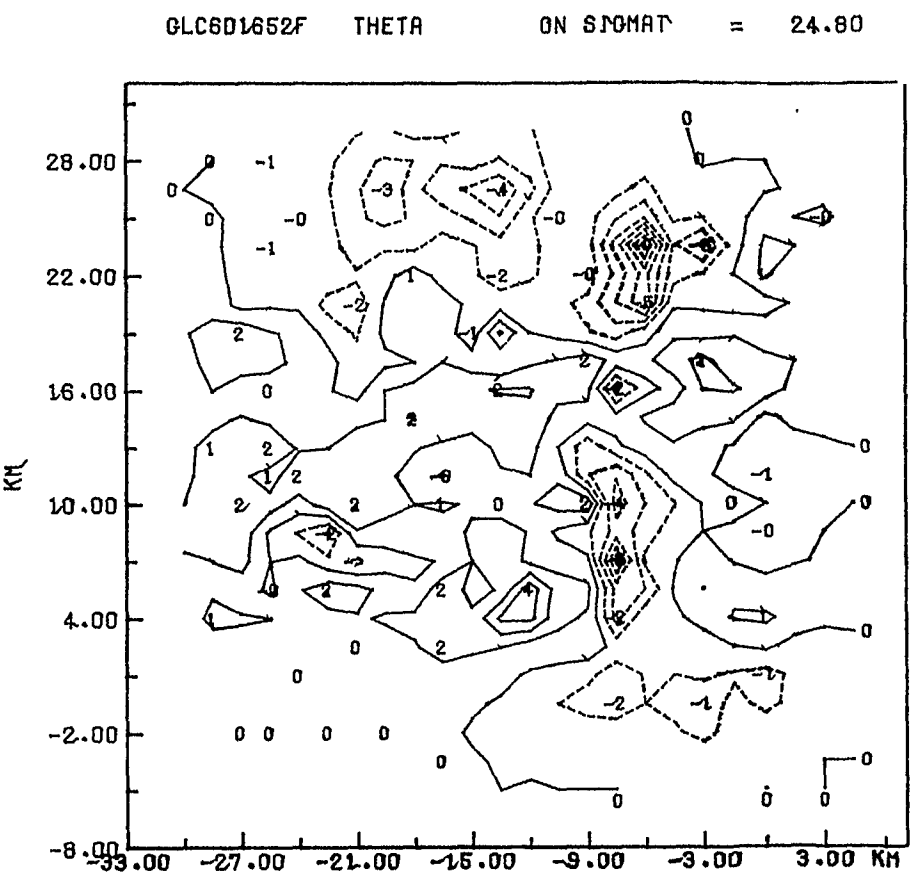

GLC6D1652F THETA ON SIGMAT = 24.70
KM
28.00
22.00
16.00
10.00
4.00
-2.00
-8.00
-33.00 -27.00 -21.00 -15.00 -9.00 -3.00 3.00 KM

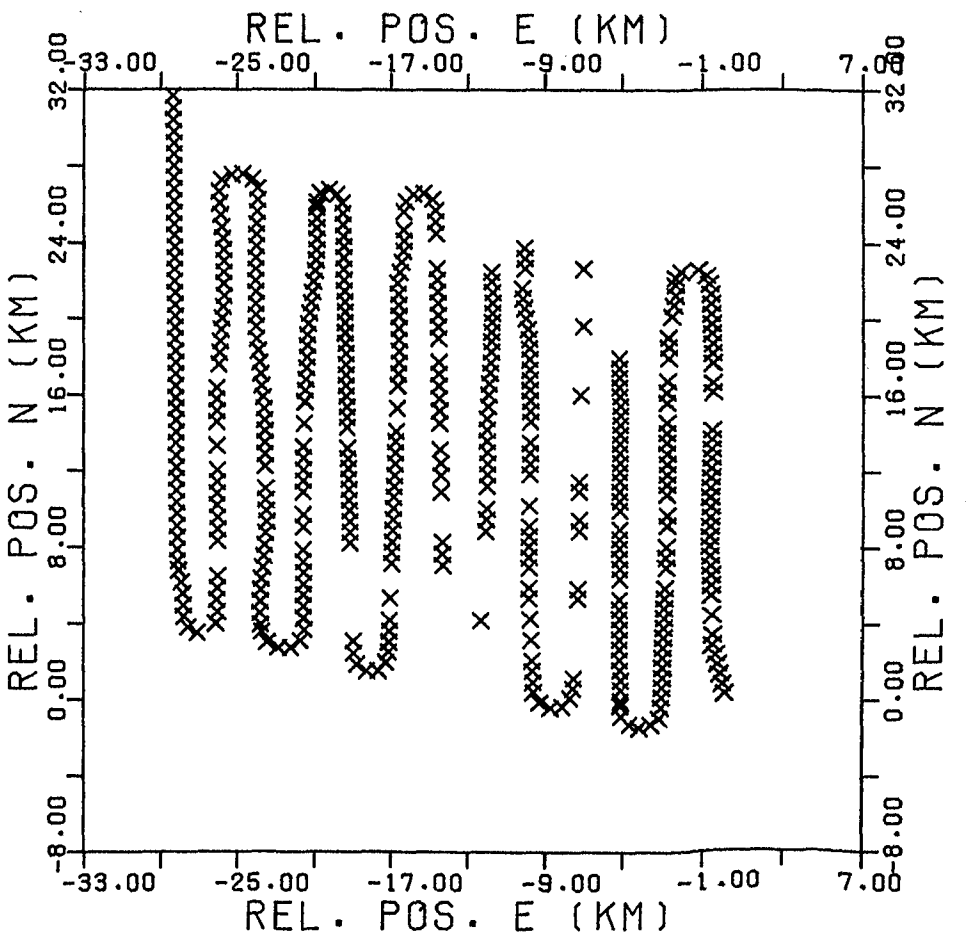

REL. POS. E (KM)
-33.00 -25.00 -17.00 -9.00 -1.00 7.00
REL. POS. N (KM)
32.00 24.00 16.00 8.00 0.00 -8.00



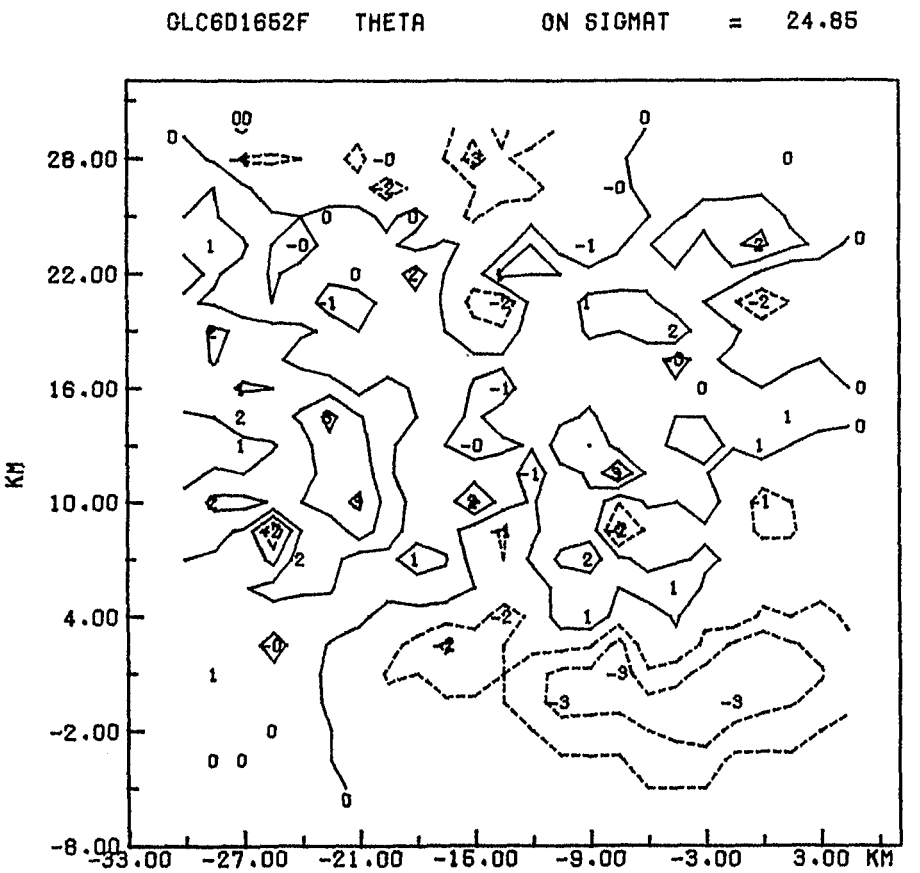


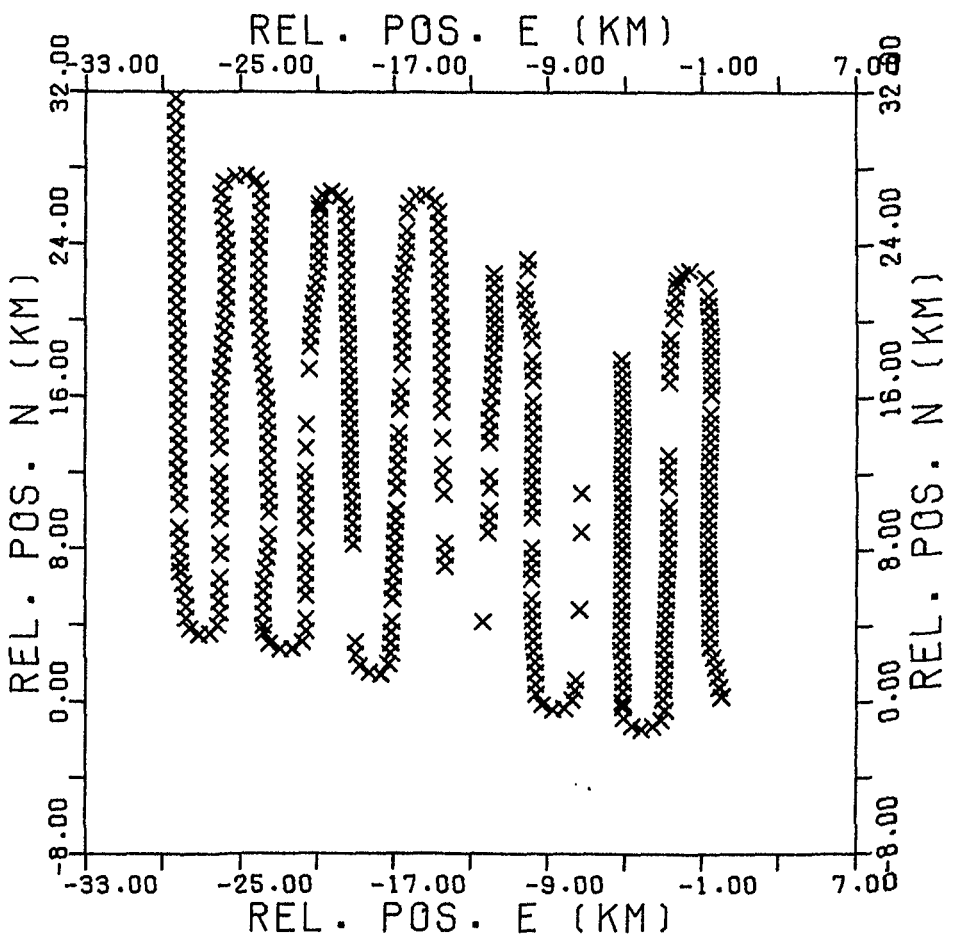
-Potential Temperature on Isopycnic Surfaces-



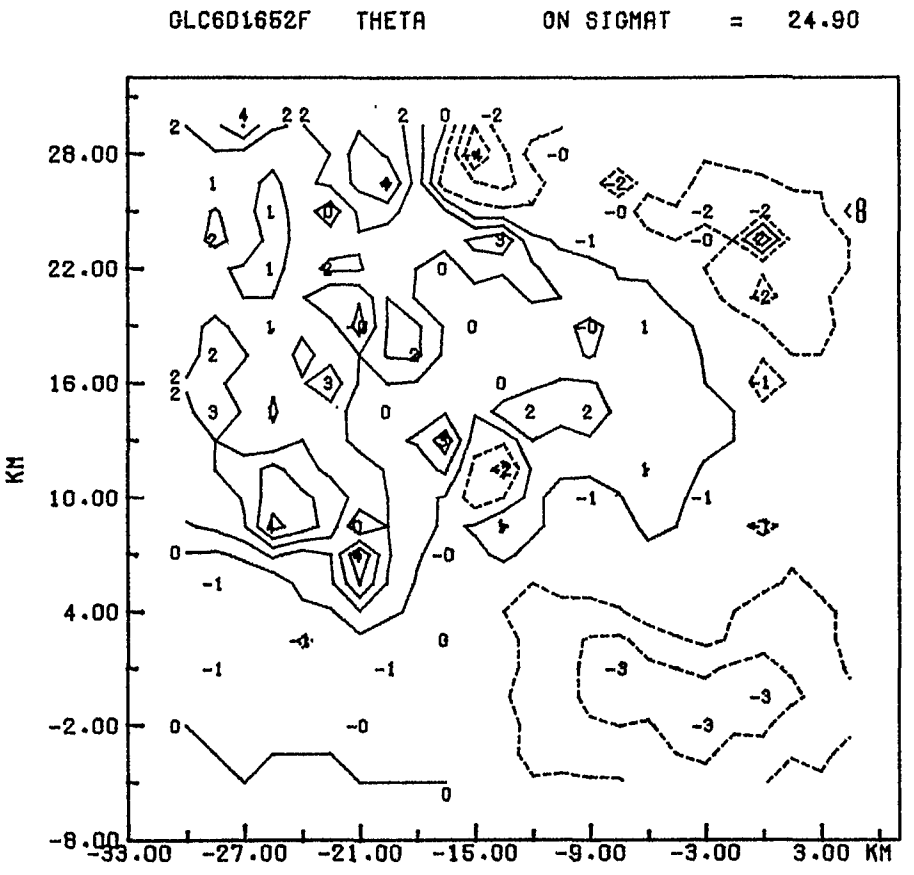


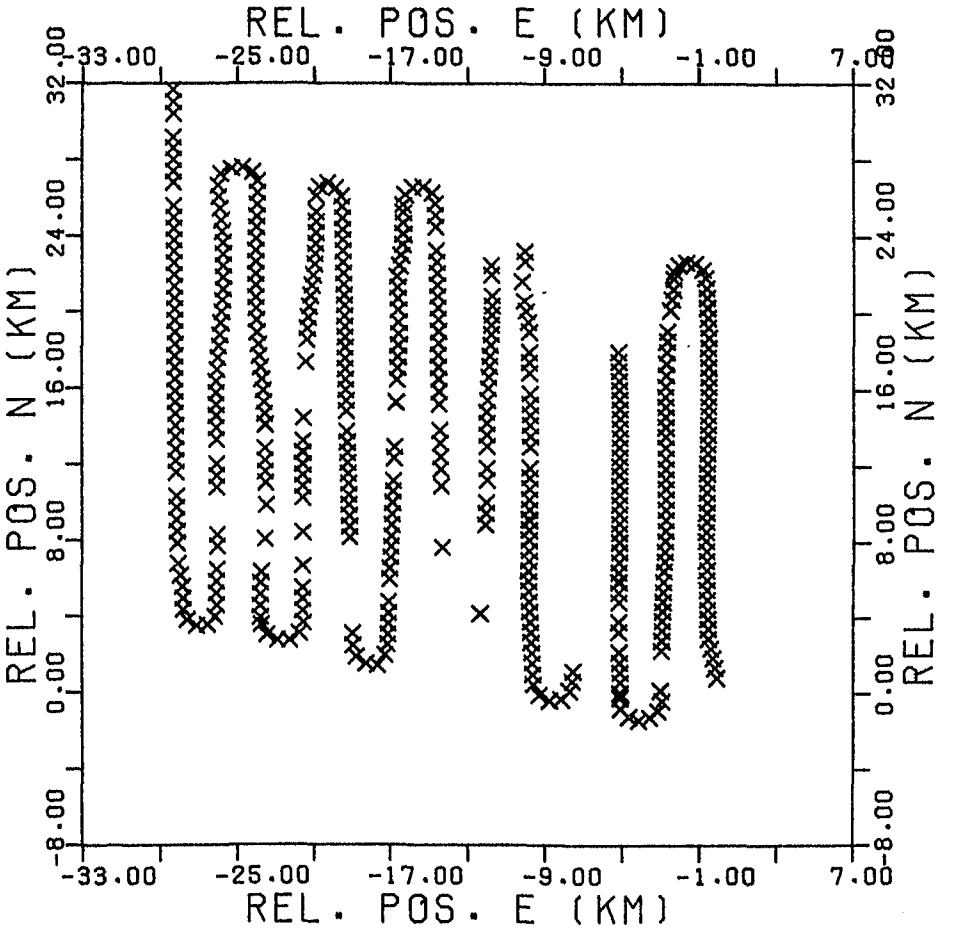
-Potential Temperature on Isopycnic Surfaces-



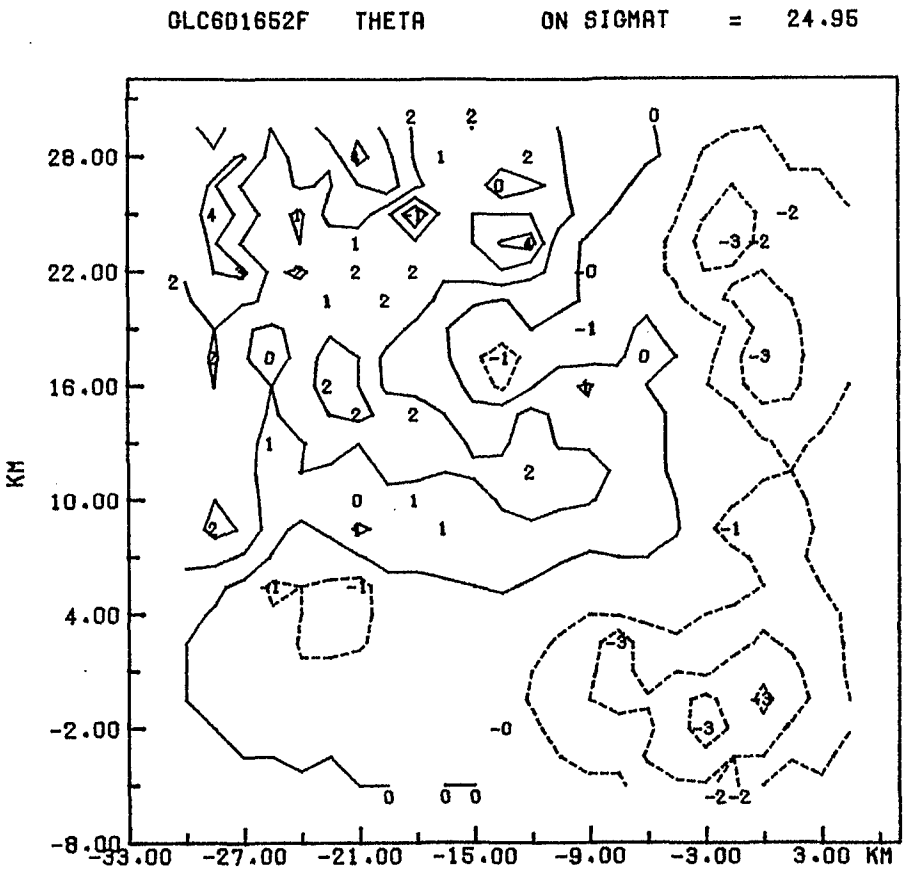


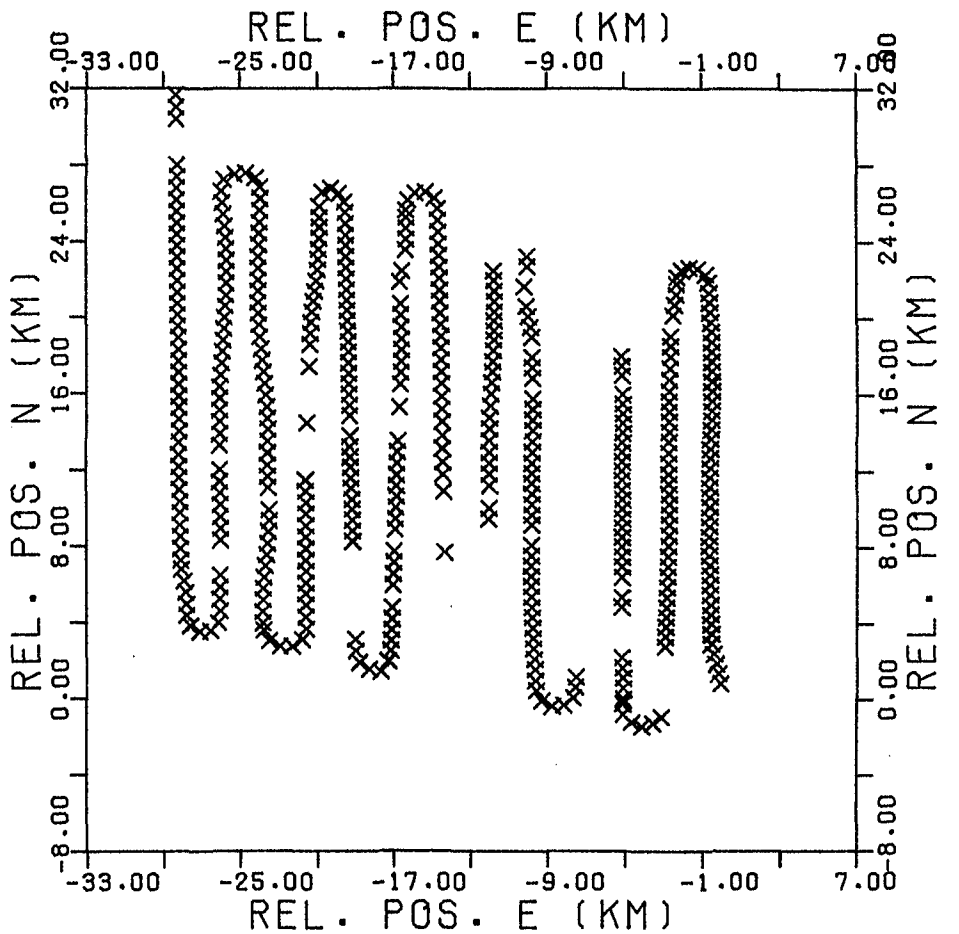
-Potential Temperature on Isopycnic Surfaces-

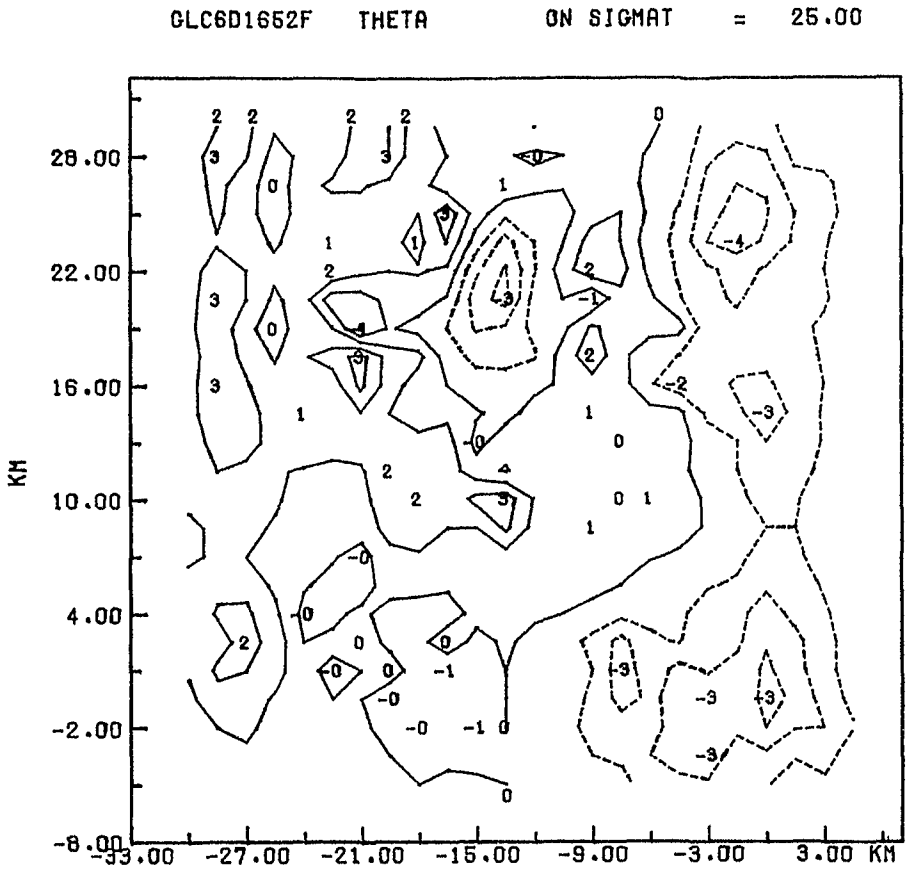

GLC6D1652F THETA ON SIGMAT = 24.90
KM
28.00
22.00
16.00
10.00
4.00
-2.00
-8.00
-33.00
-27.00
-21.00
-15.00
-9.00
-3.00
3.00 KM

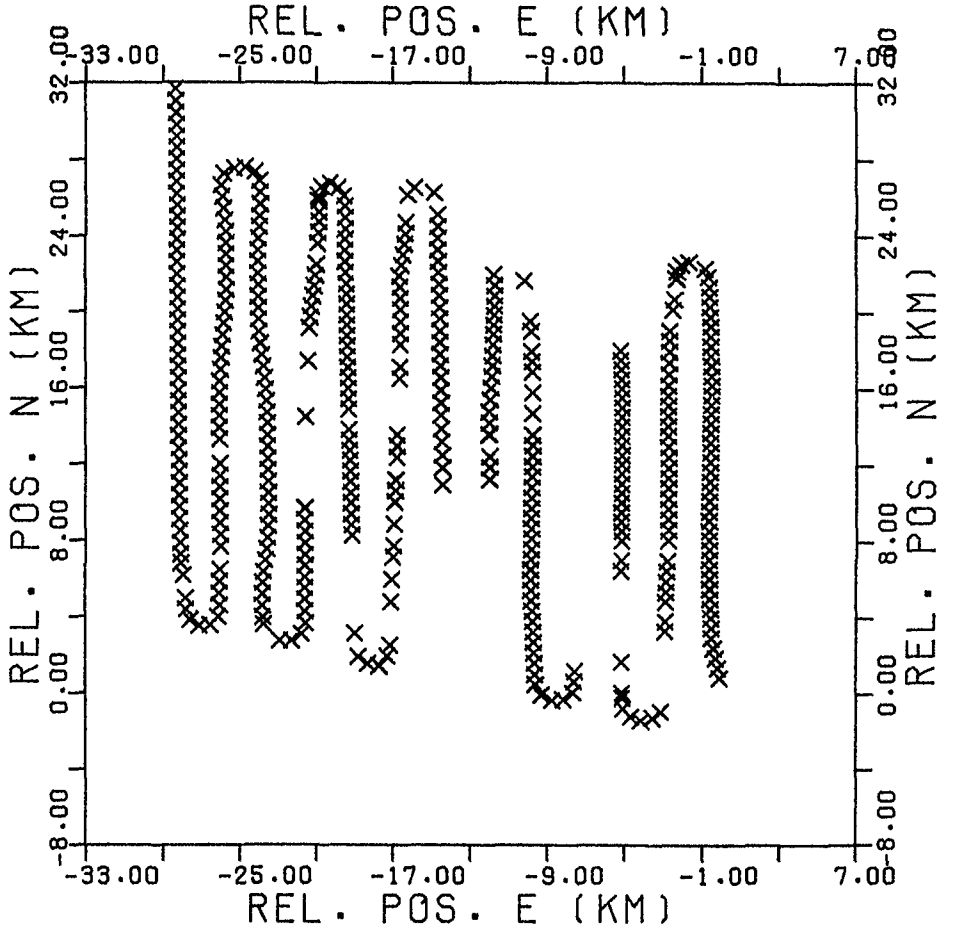

REL. POS. E (KM)
-33.00
-25.00
-17.00
-9.00
-1.00
7.00
REL. POS. N (KM)
32.00
24.00
16.00
8.00
0.00
-8.00

-Potential Temperature on Isopycnic Surfaces-







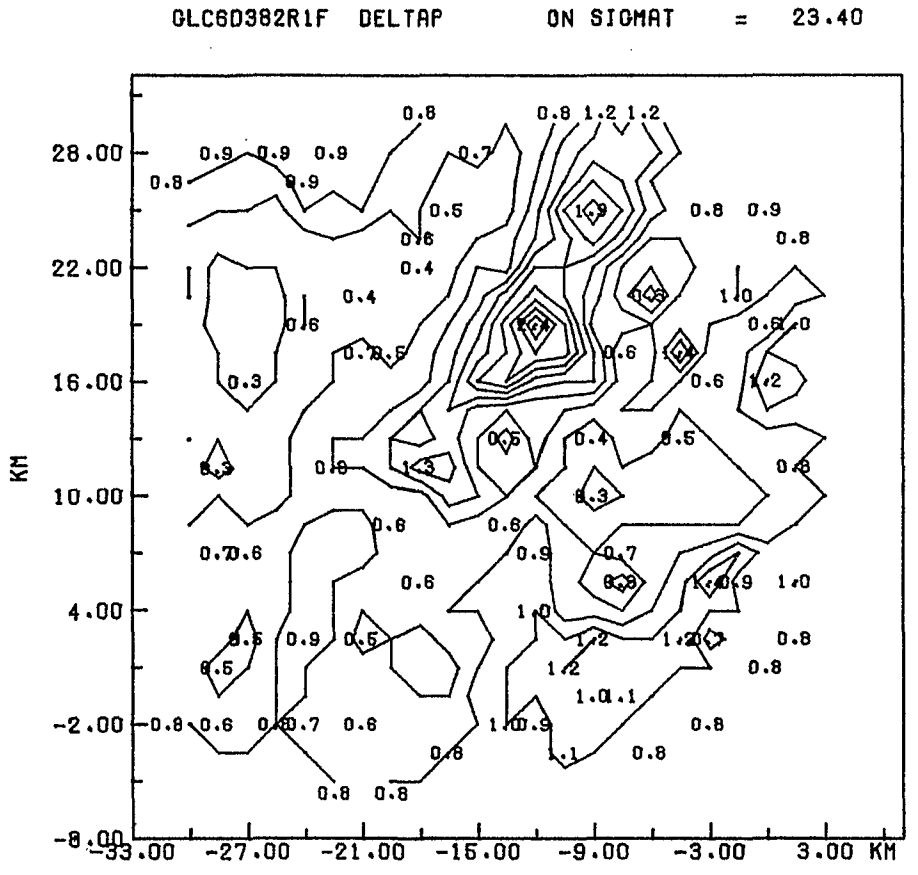


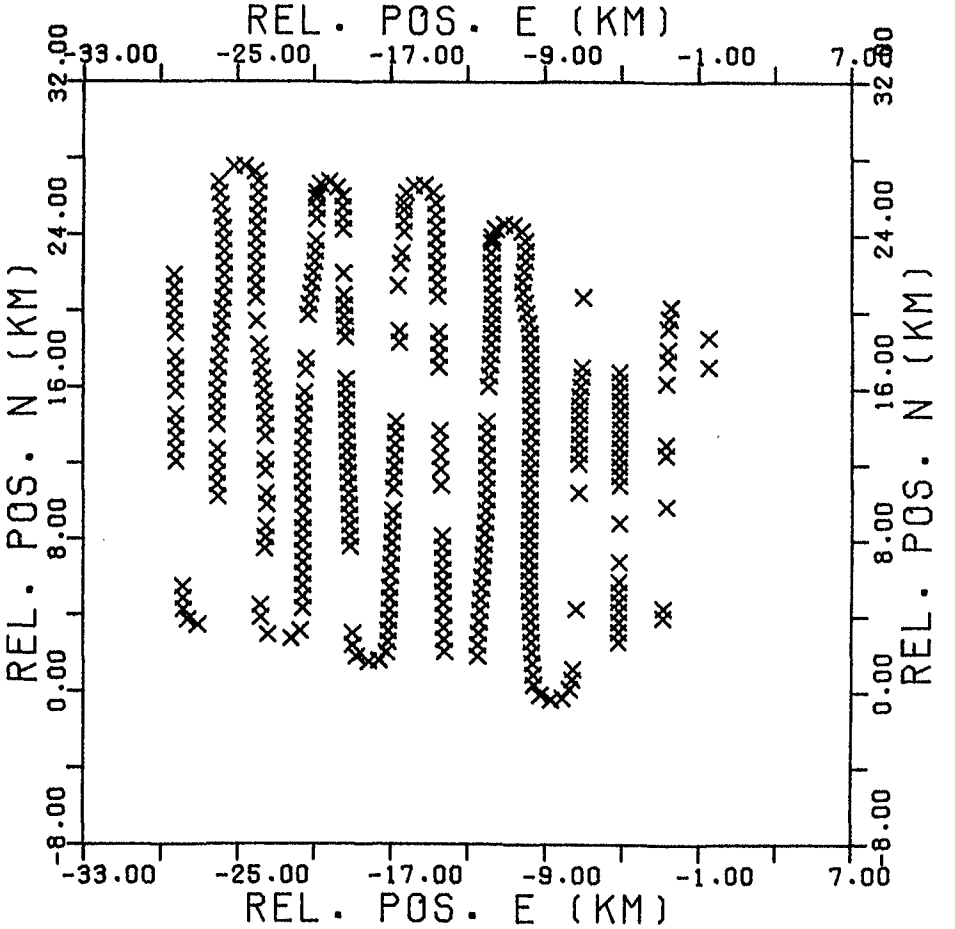
-Potential Temperature on Isopycnic Surfaces-

2. Contoured maps of thickness (the spacing between a pair of isopycnals; units in dbar).

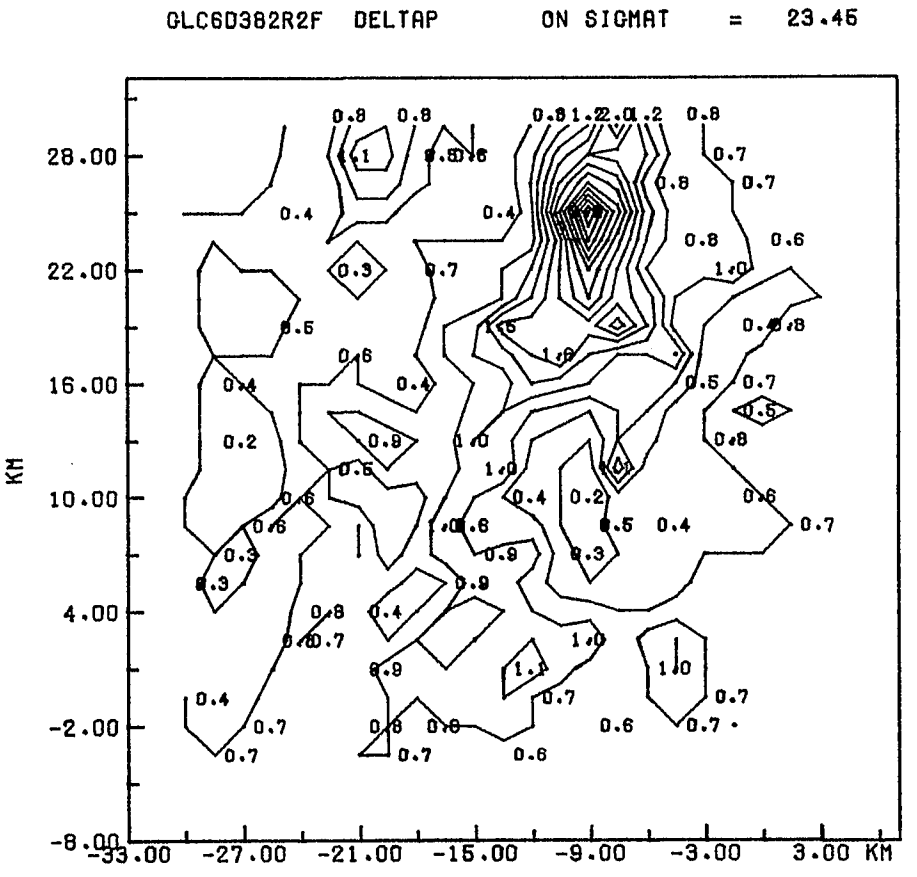
   The indicated surface in each map is the lower one; the upper surface has a density 0.10 σ_t less. The maps are plotted for intervals of 0.05 σ_t, over the range 23.40 to 24.65 σ_t. The contours are related to finestructure of N^2 (where N is the Brunt-Väisälä frequency).

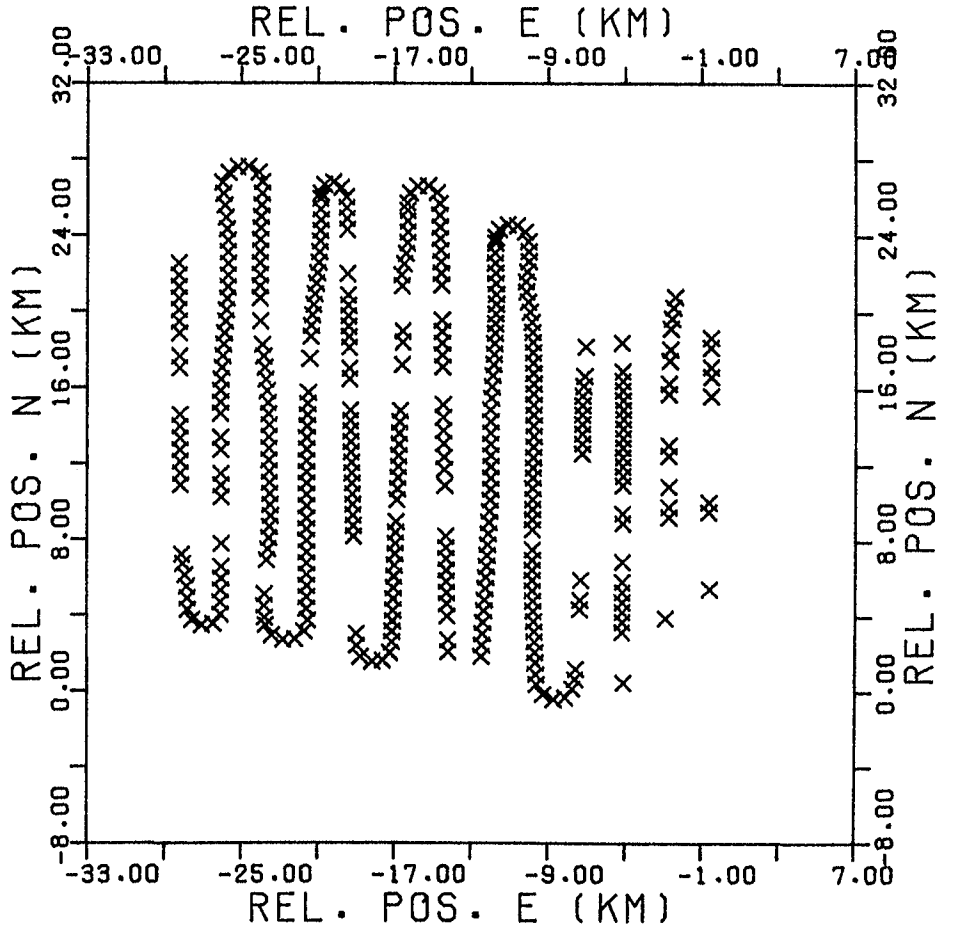
   The contour interval is 0.2 dbar and the grid spacing used in the objective analysis was 1.5 km. These maps have a scale of 1:400 000.



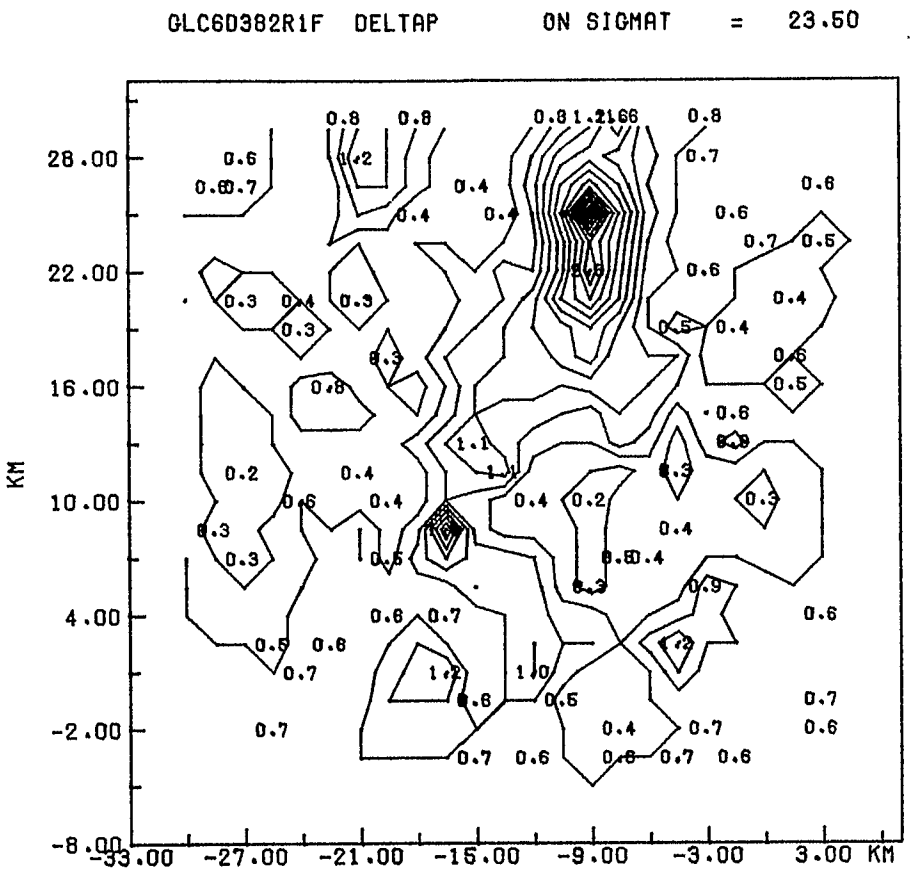


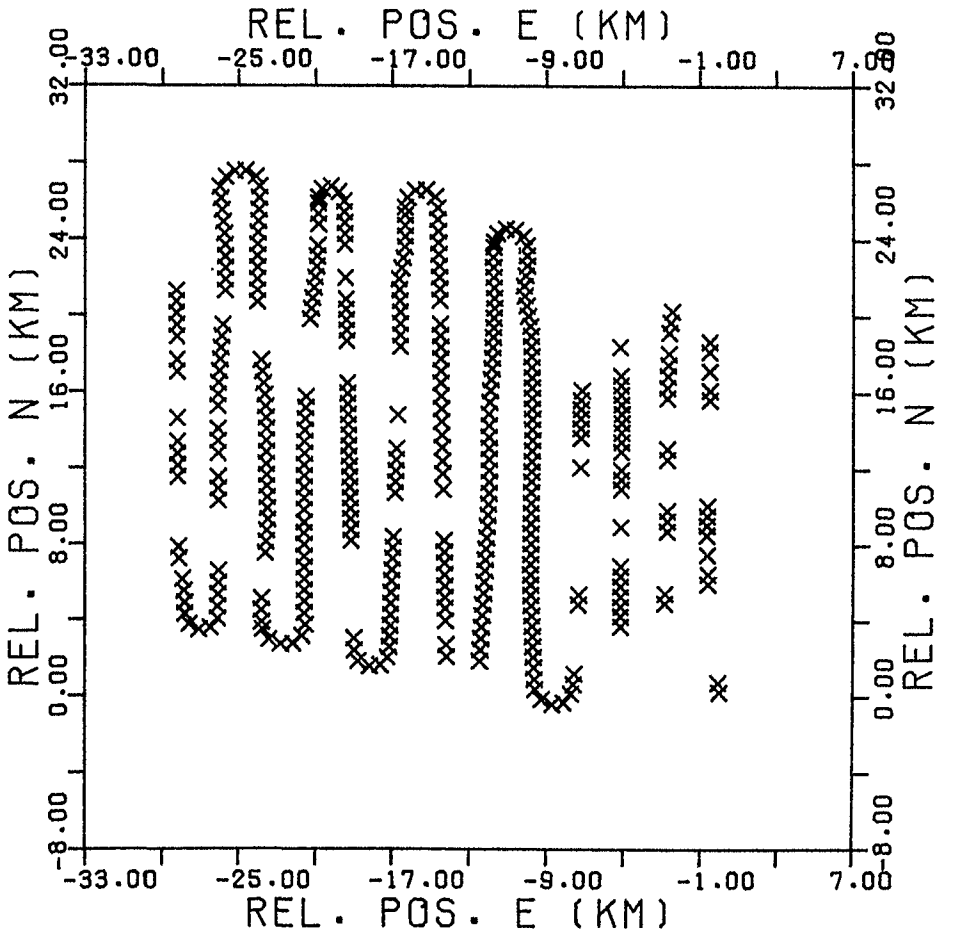
-Thickness between Isopycnic Surfaces-



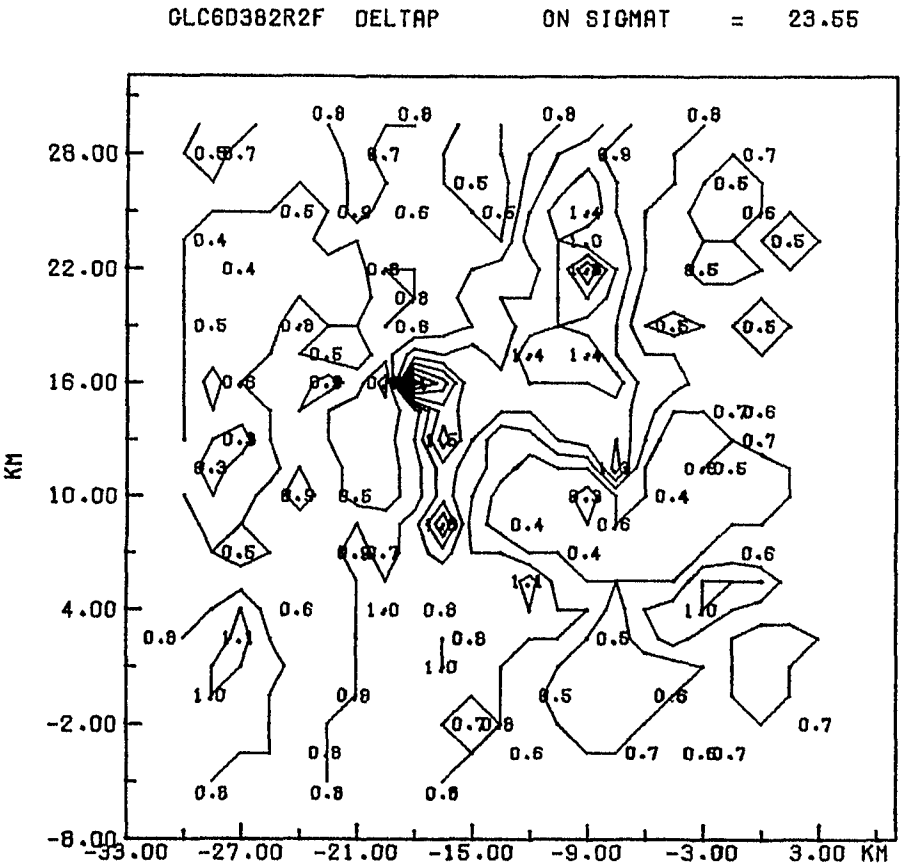


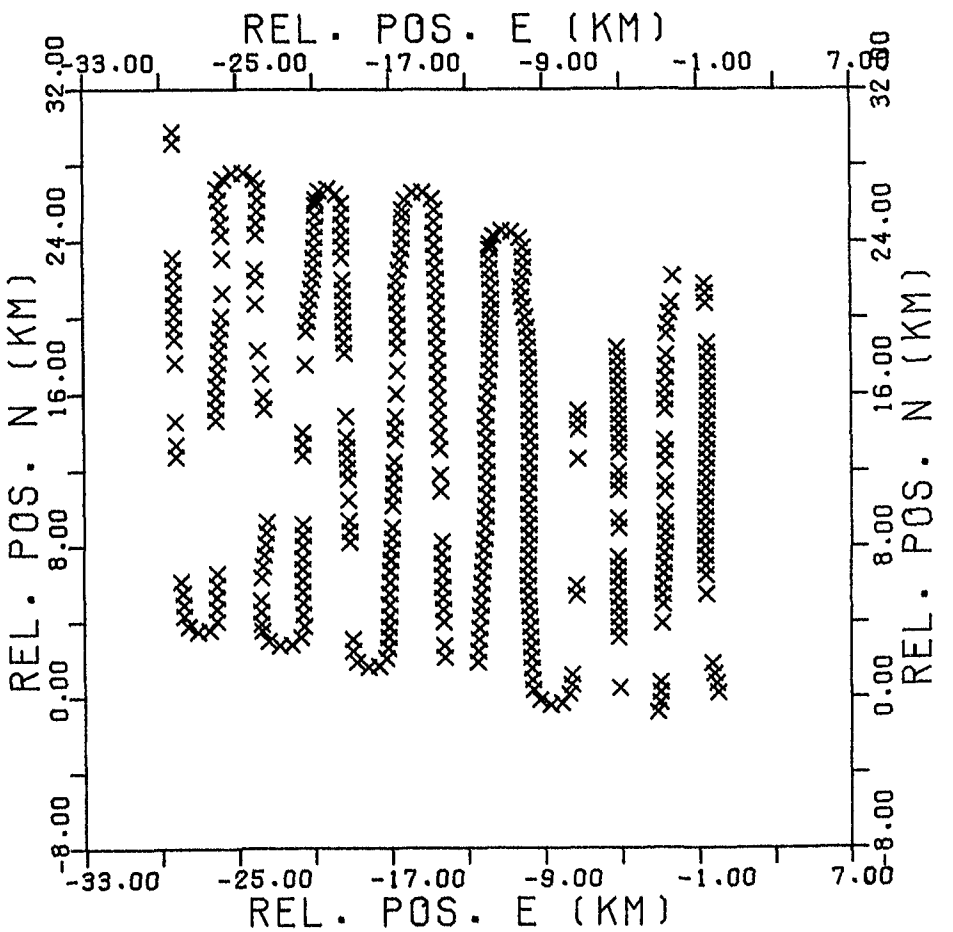
-Thickness between Isopycnic Surfaces-



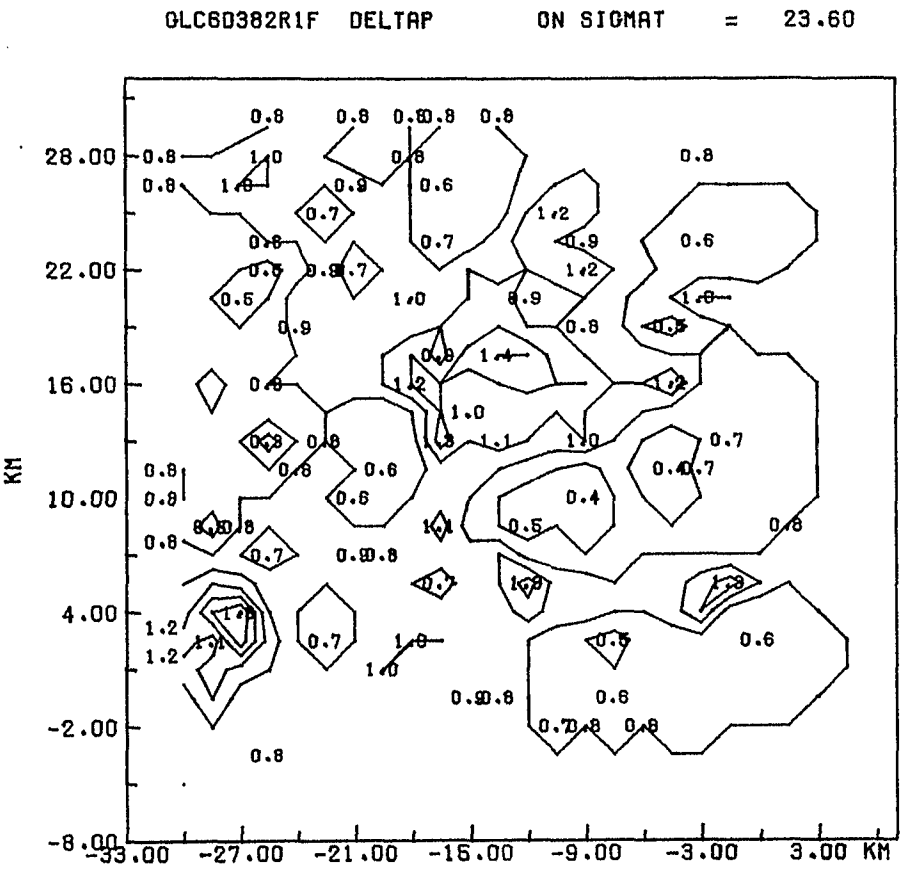


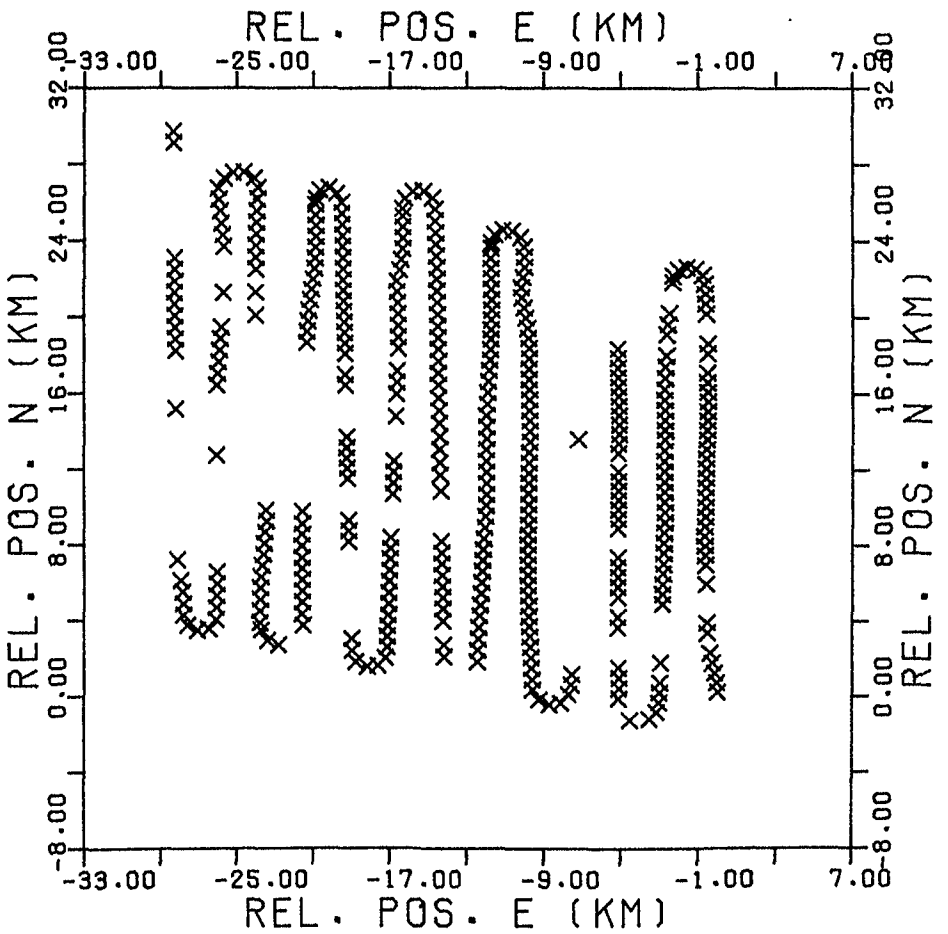
-Thickness between Isopycnic Surfaces-



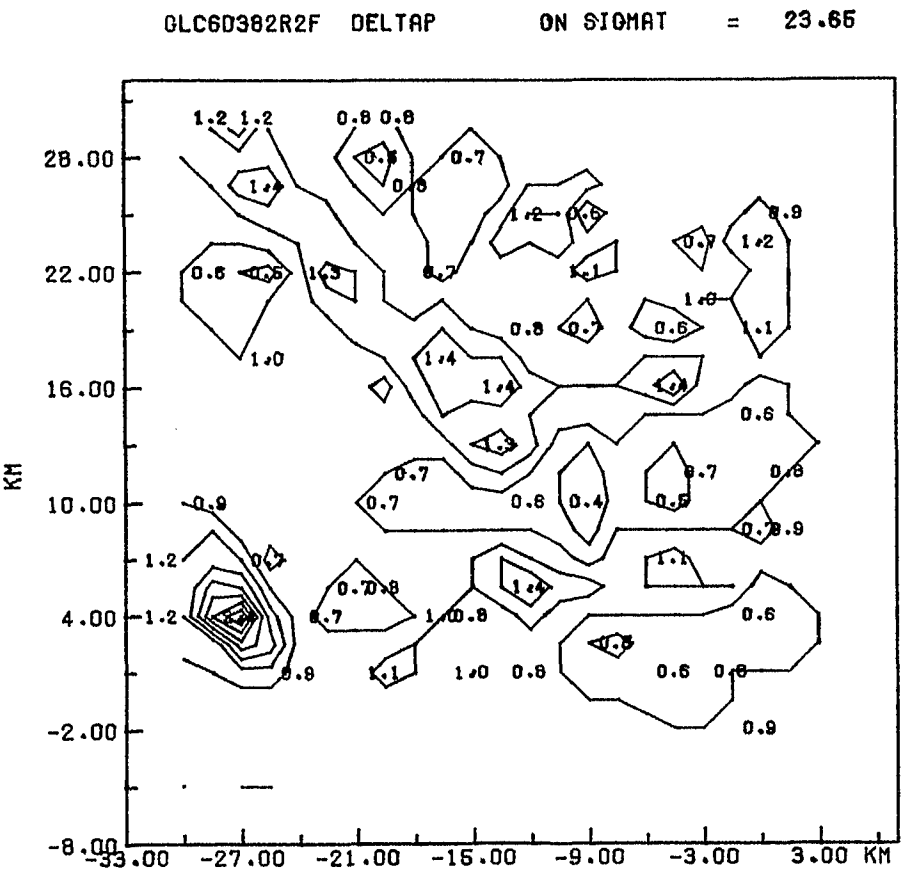


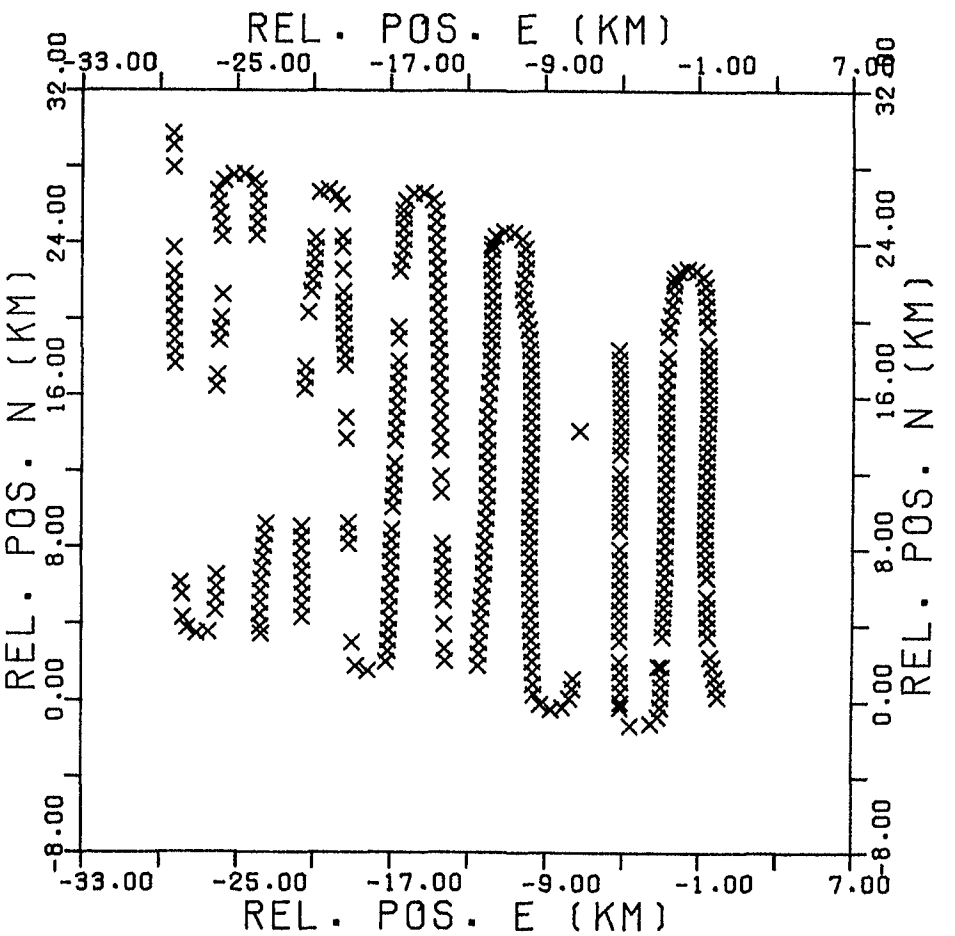
-Thickness between Isopycnic Surfaces-



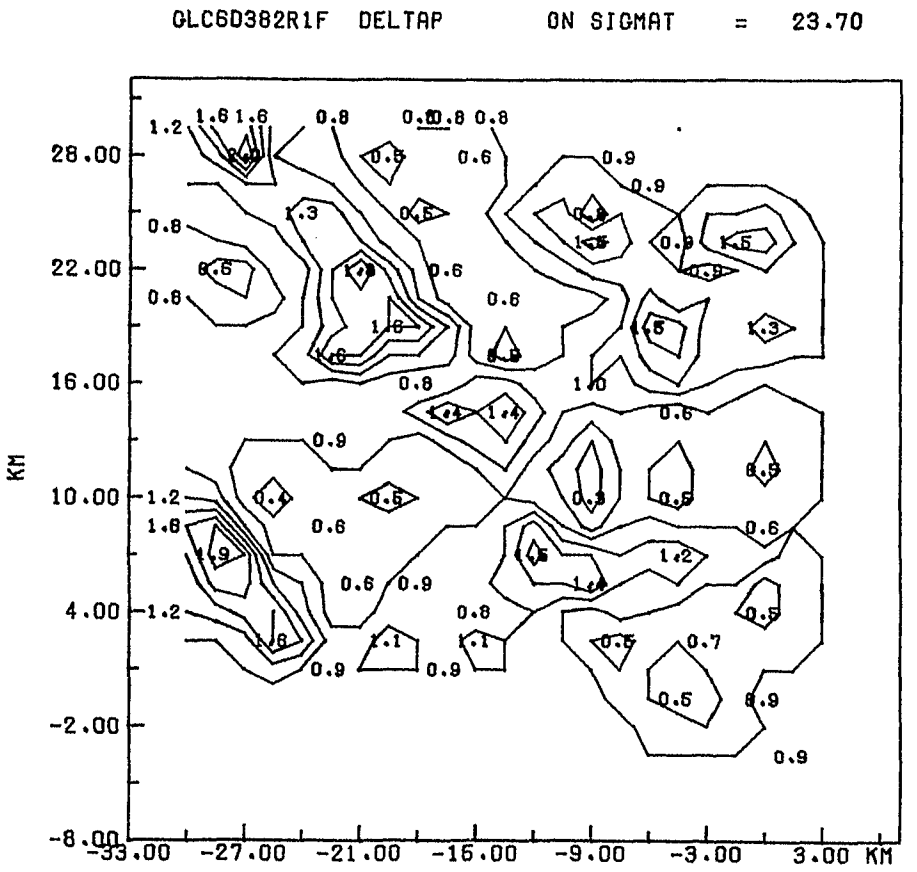


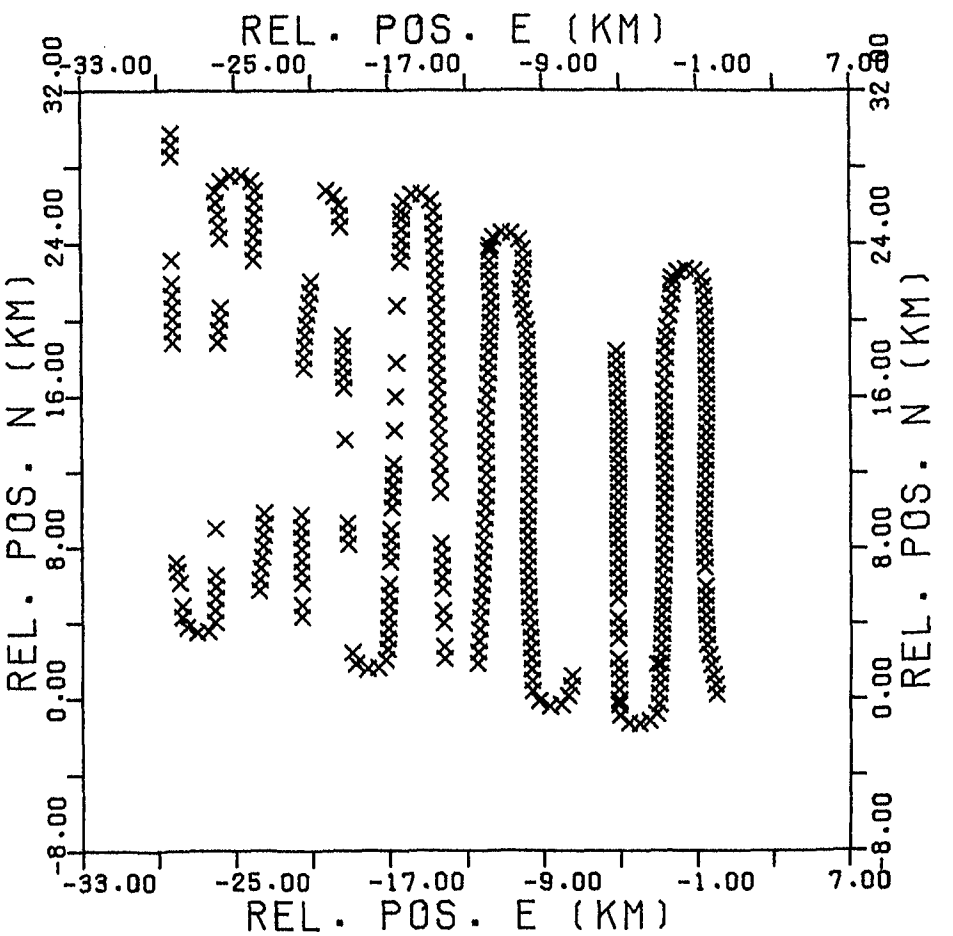
-Thickness between Isopycnic Surfaces-



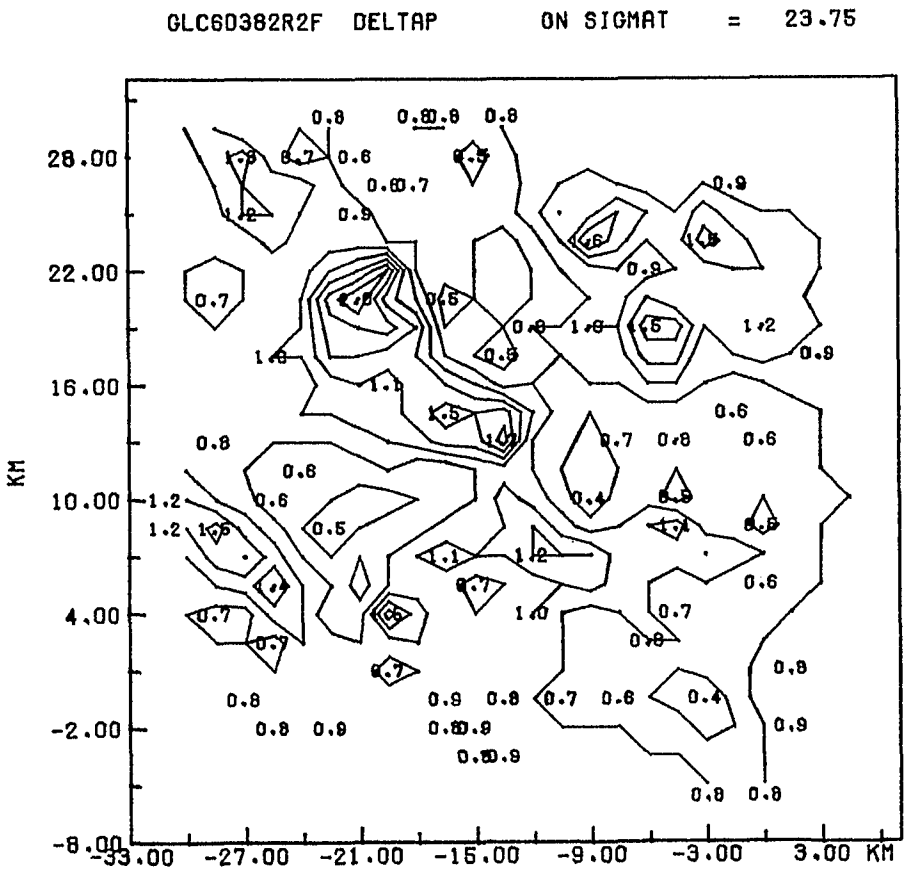


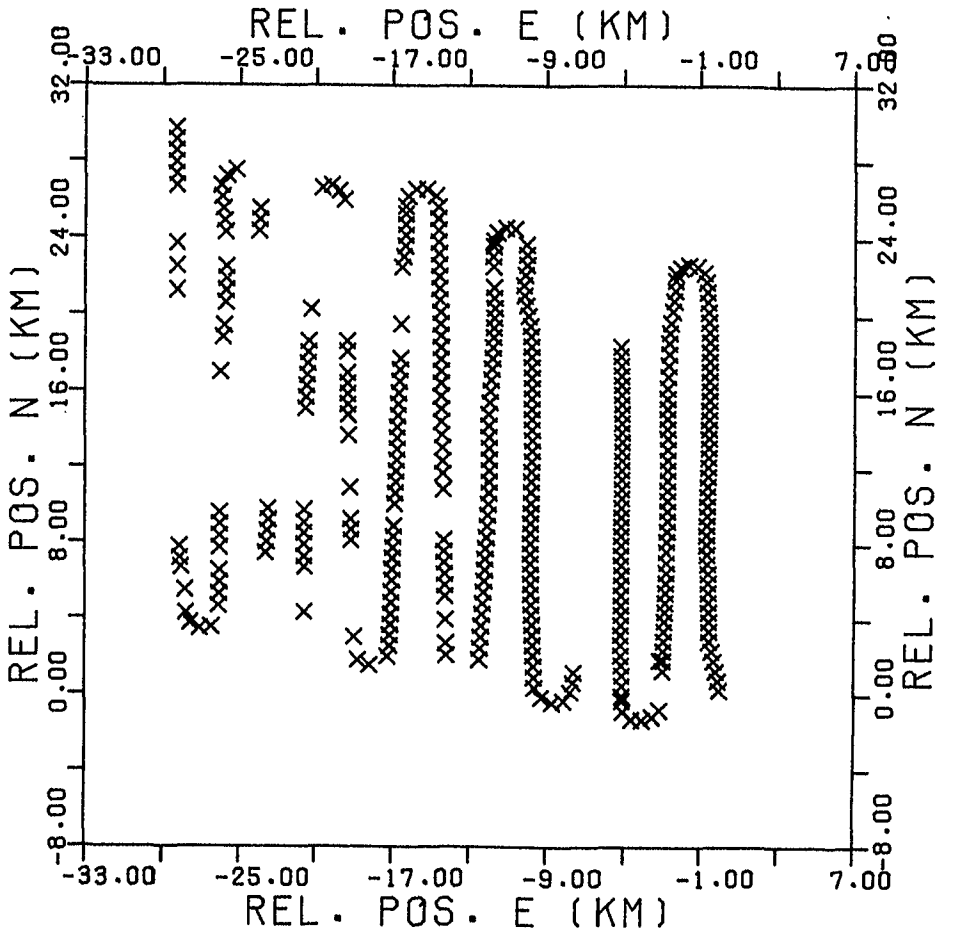
-Thickness between Isopycnic Surfaces-



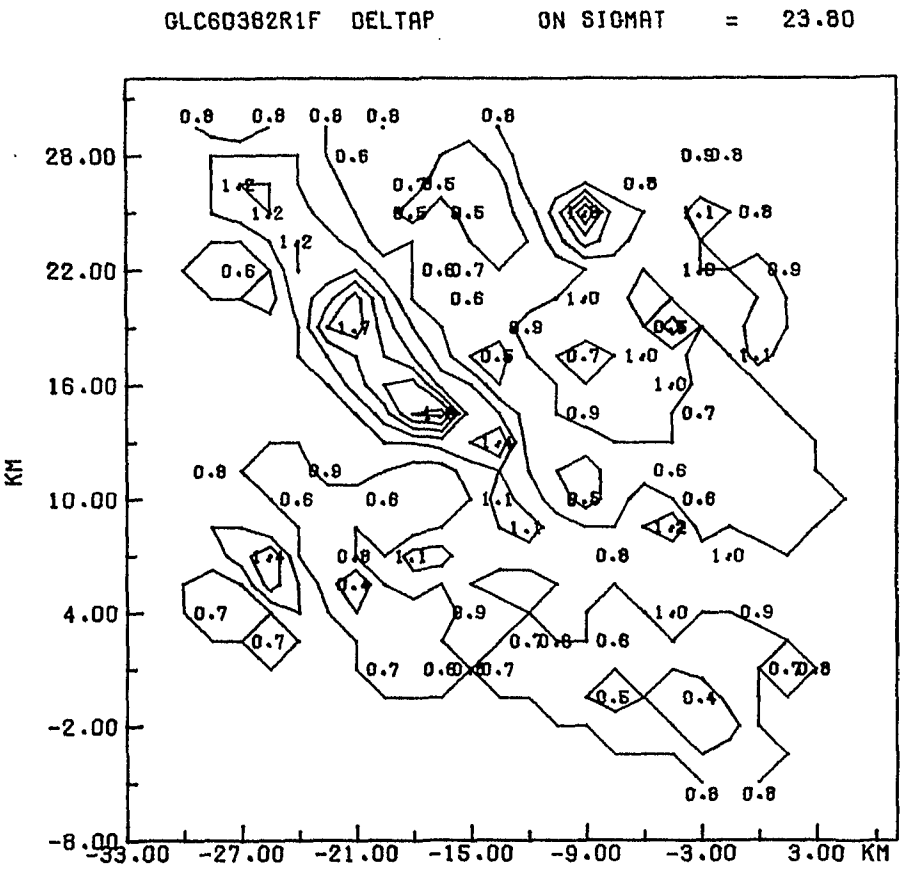


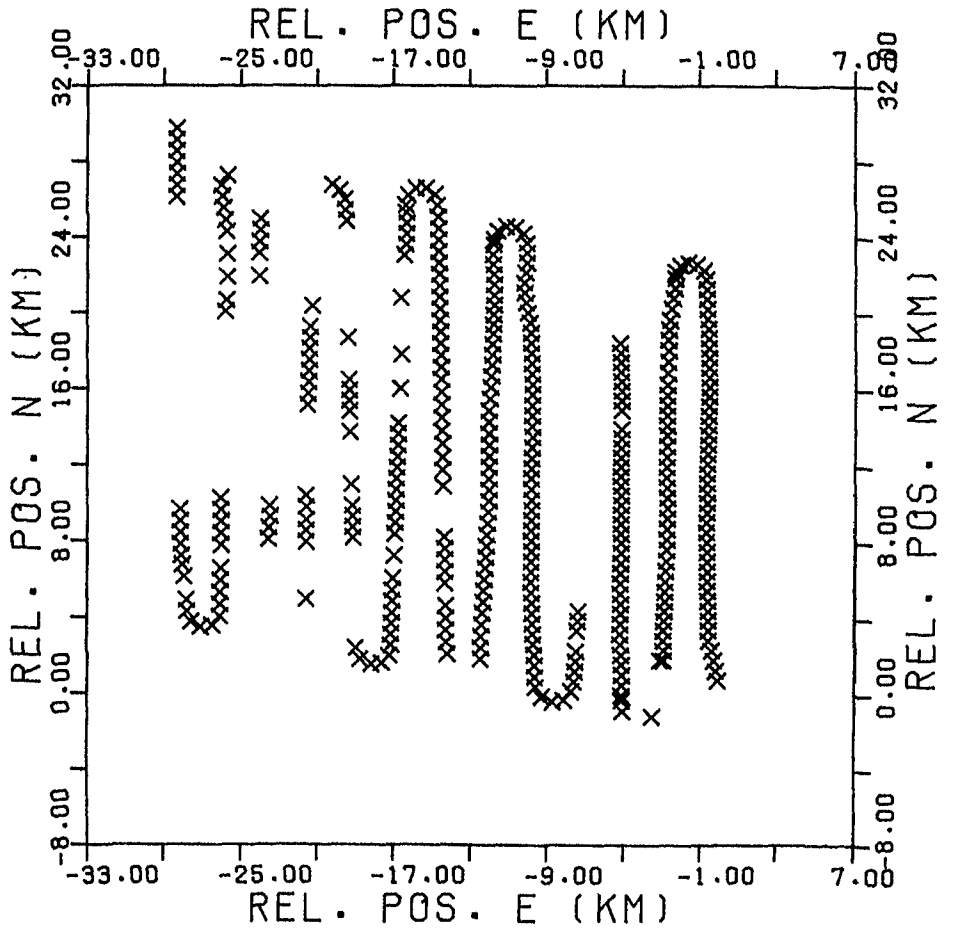
-Thickness between Isopycnic Surfaces-



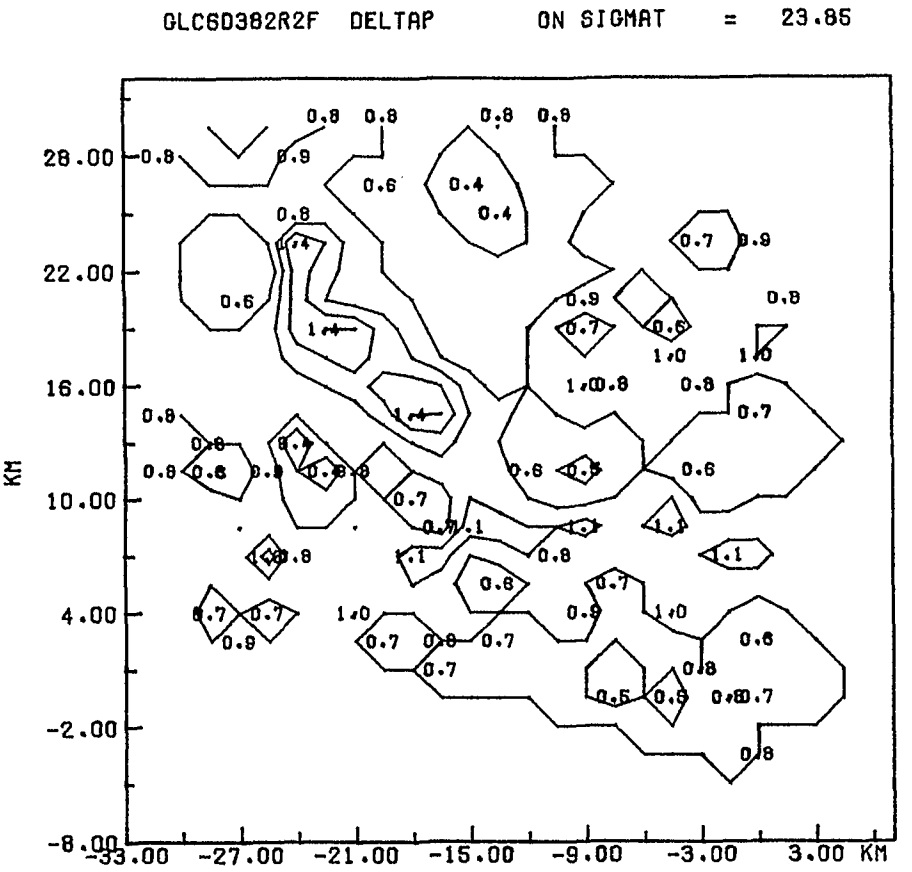


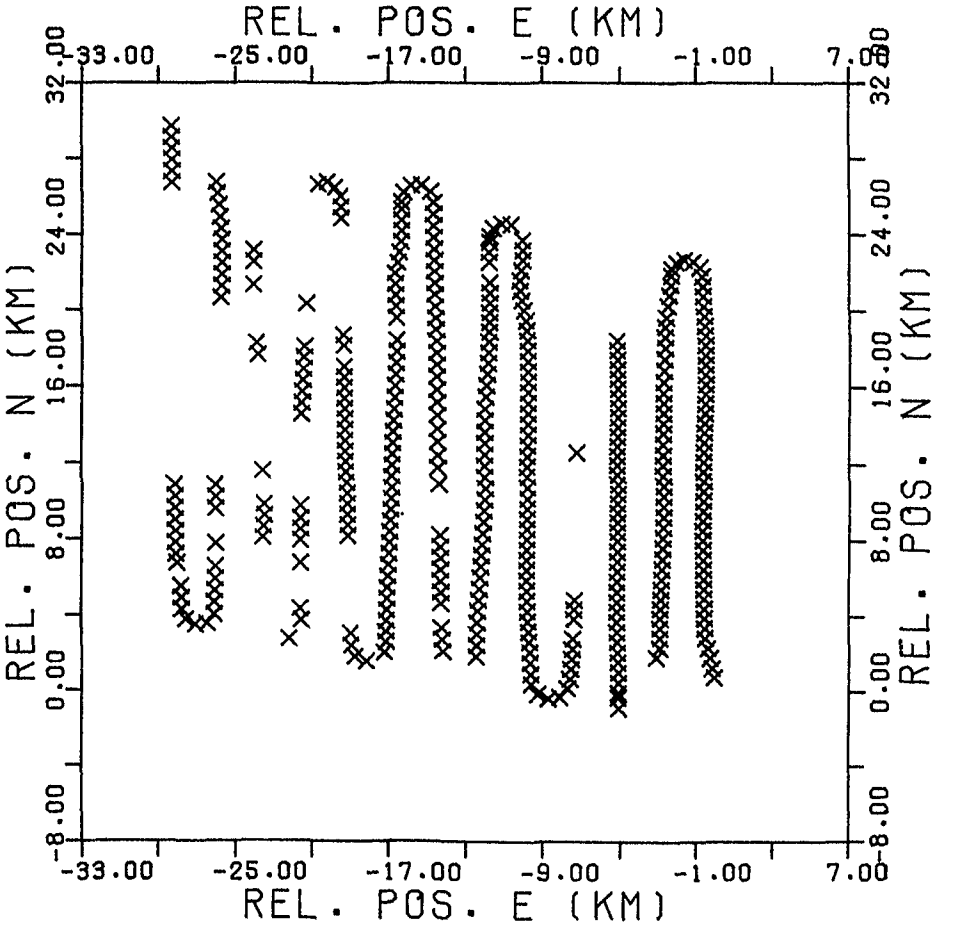
-Thickness between Isopycnic Surfaces-



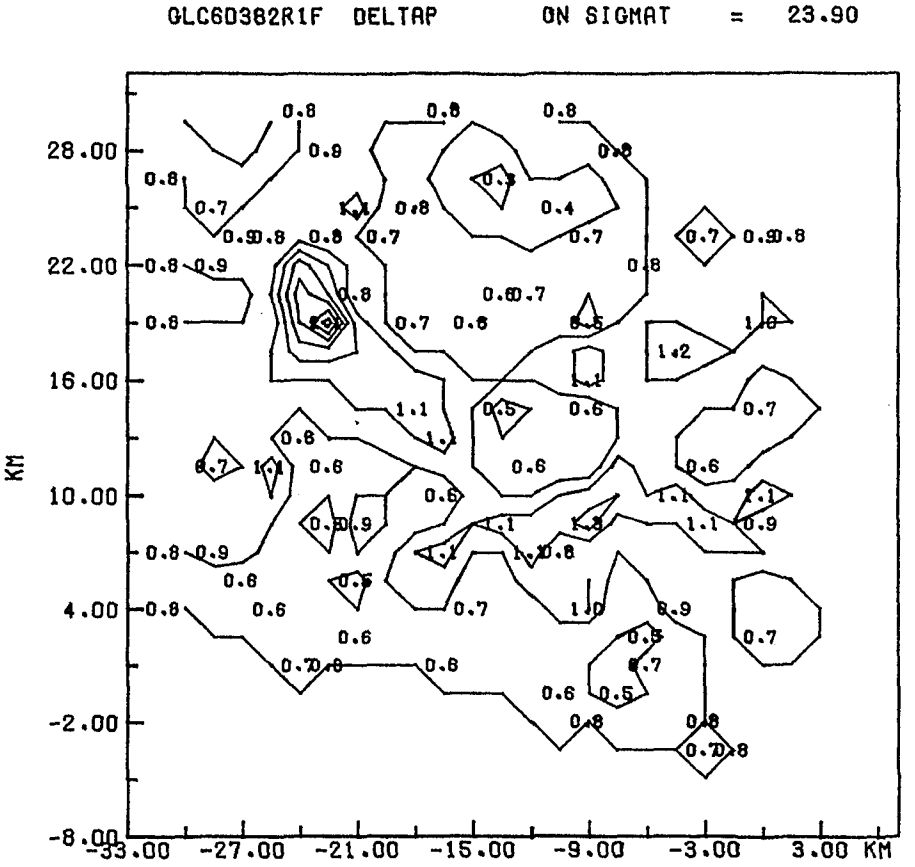


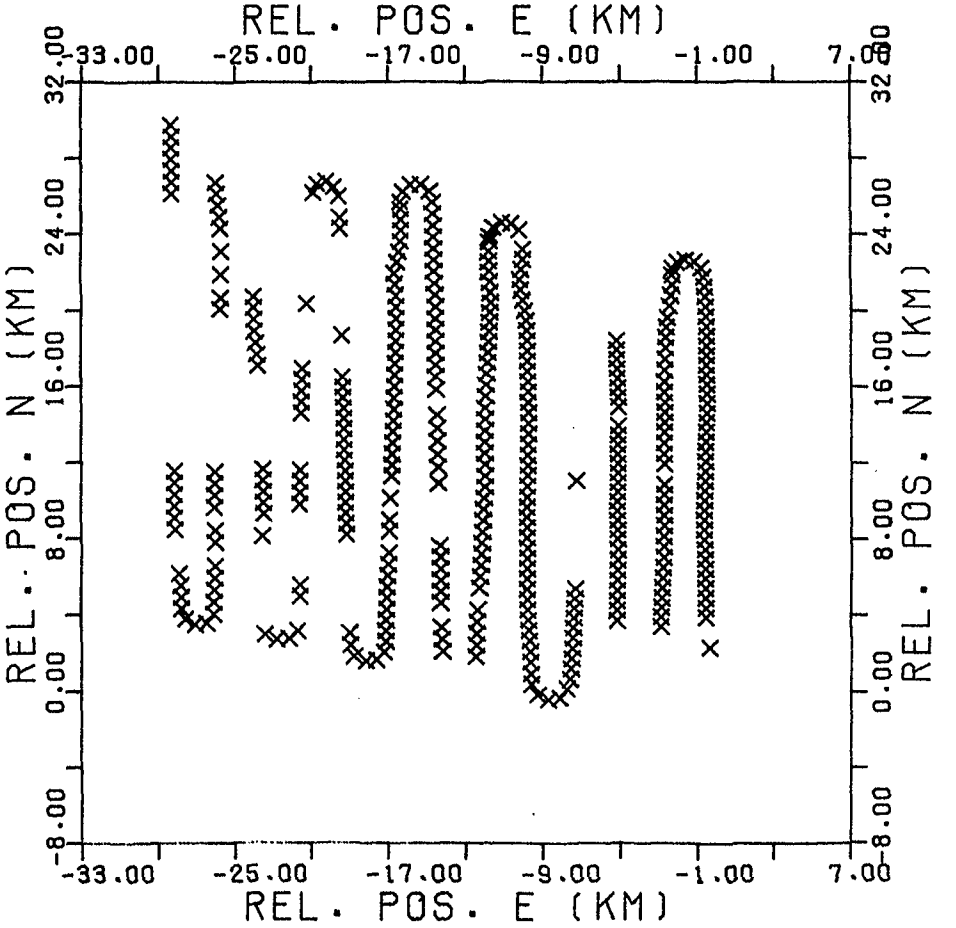
-Thickness between Isopycnic Surfaces-



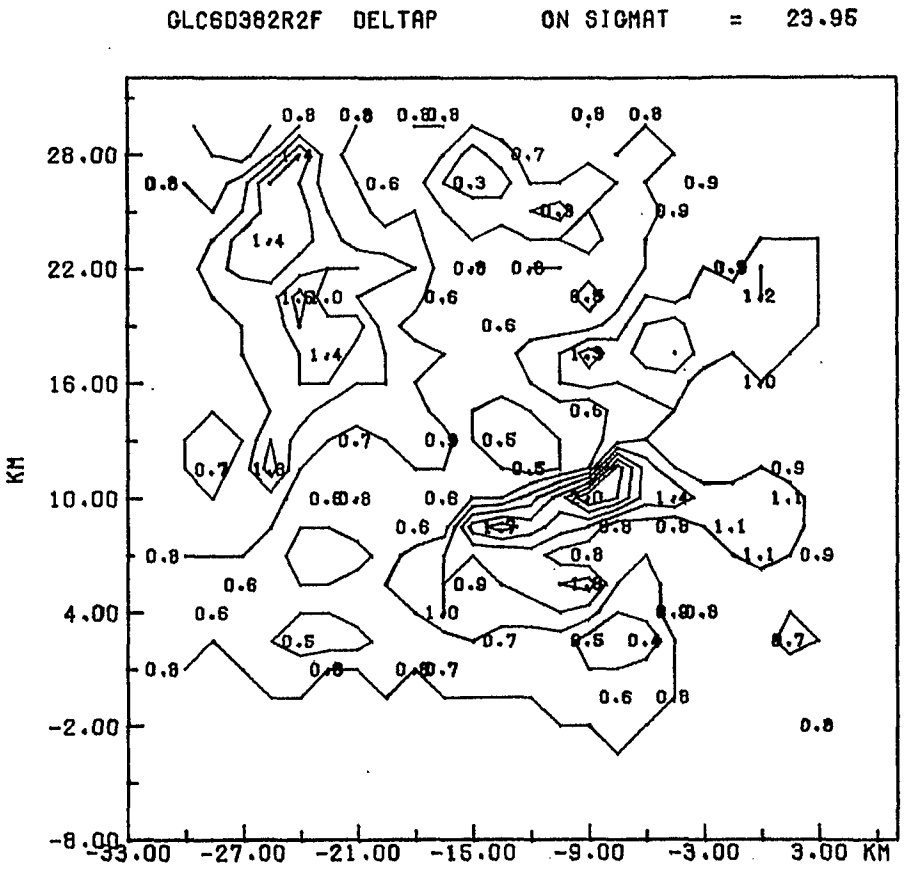


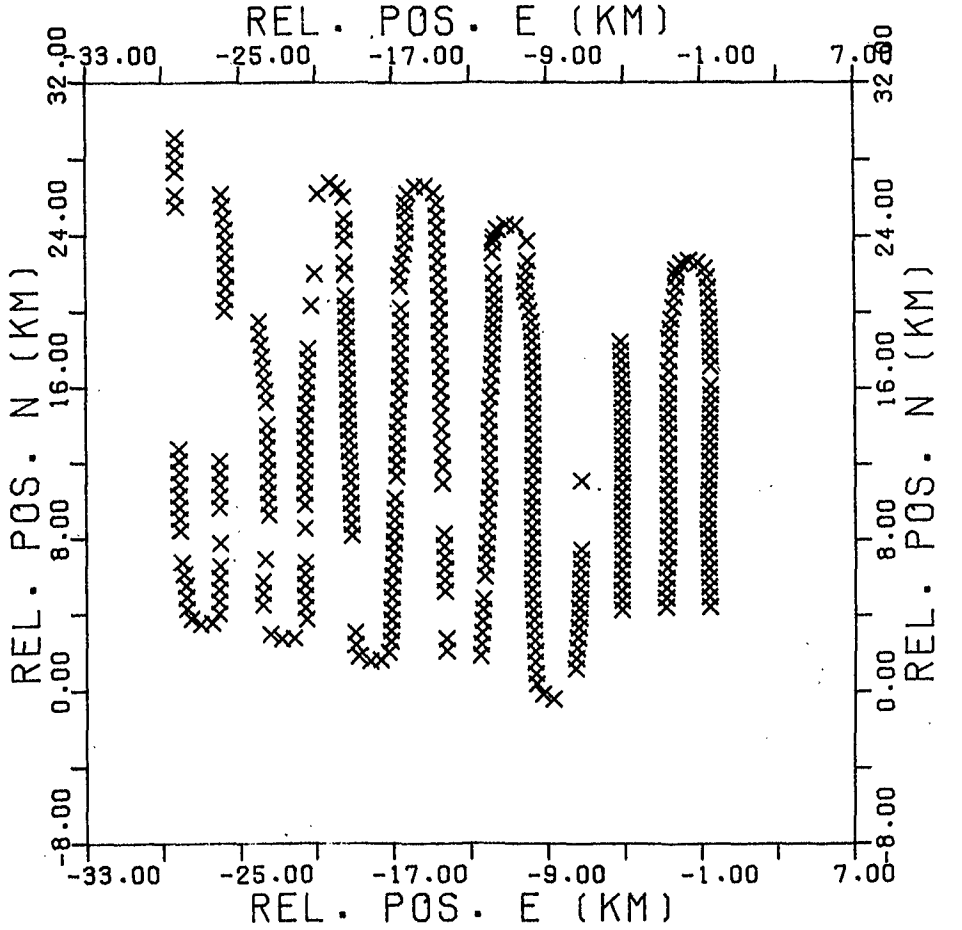
-Thickness between Isopycnic Surfaces-



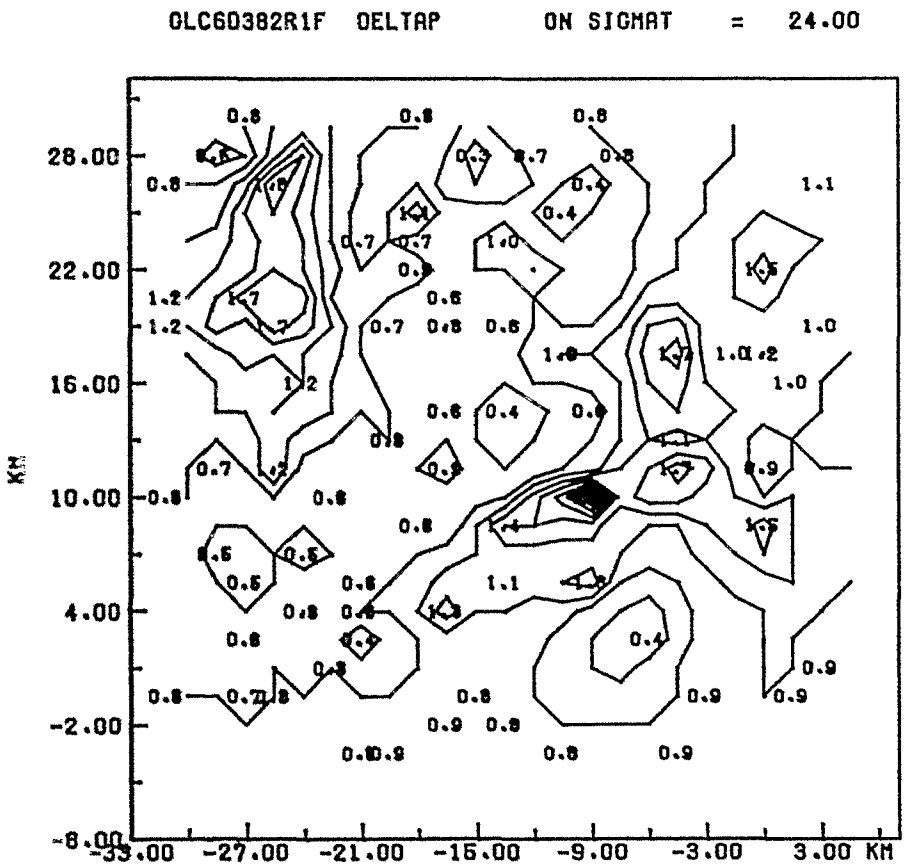


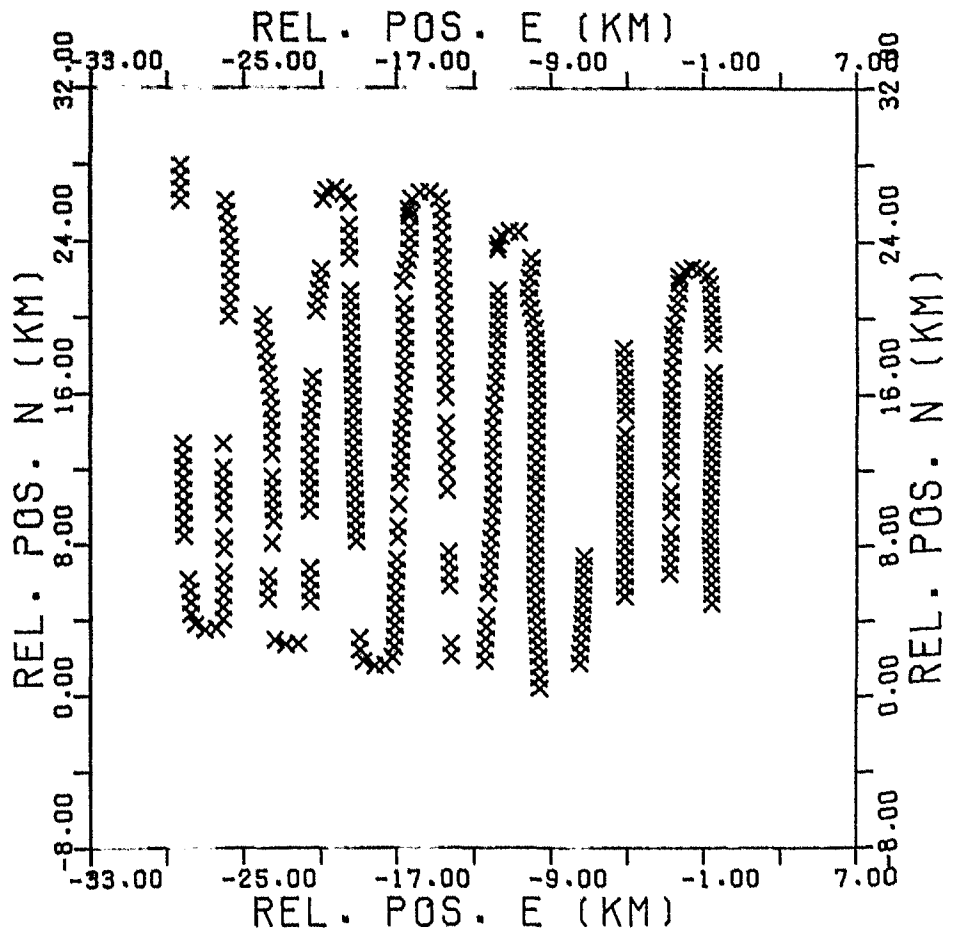
-Thickness between Isopycnic Surfaces-



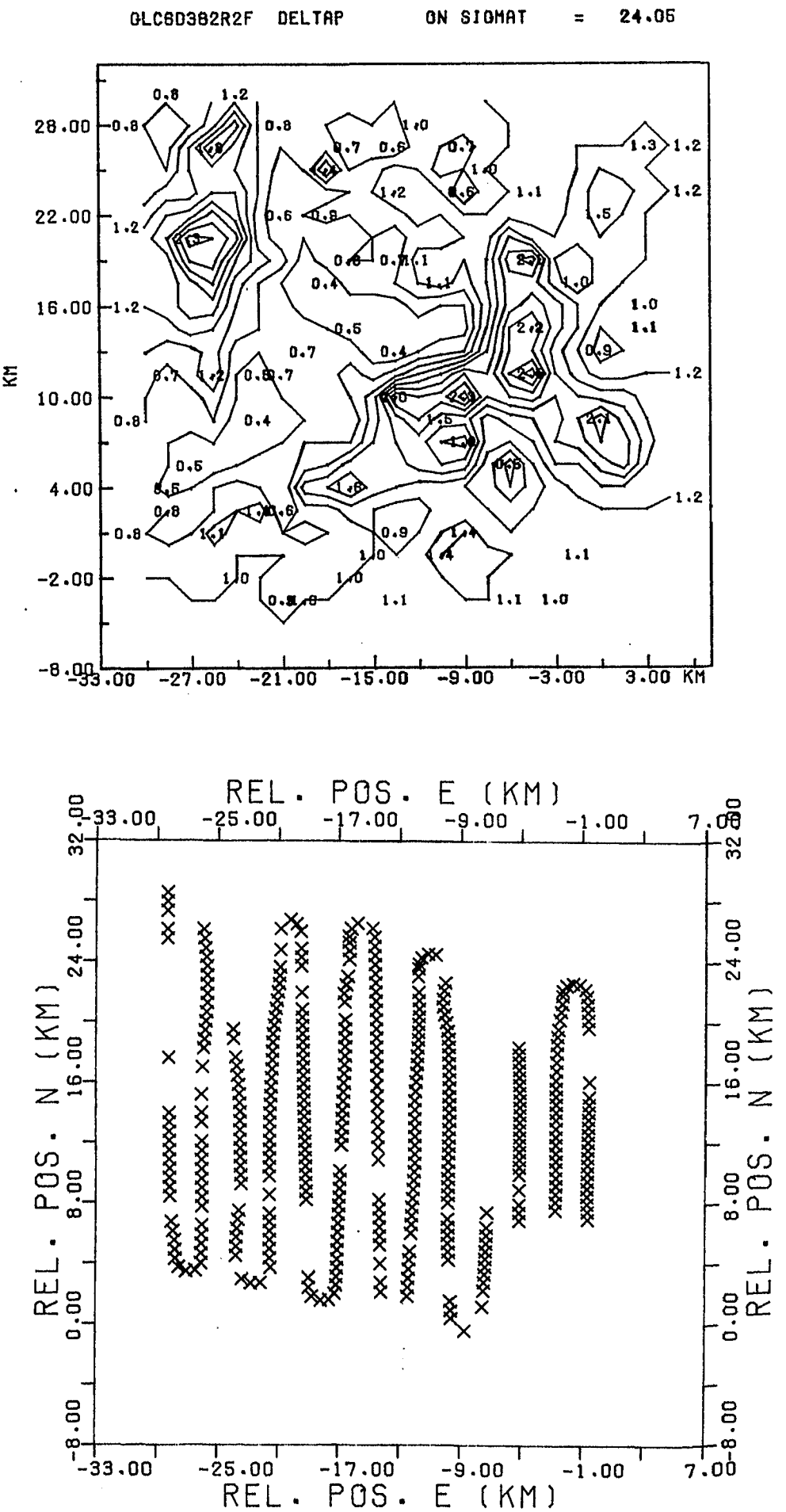


-Thickness between Isopycnic Surfaces-

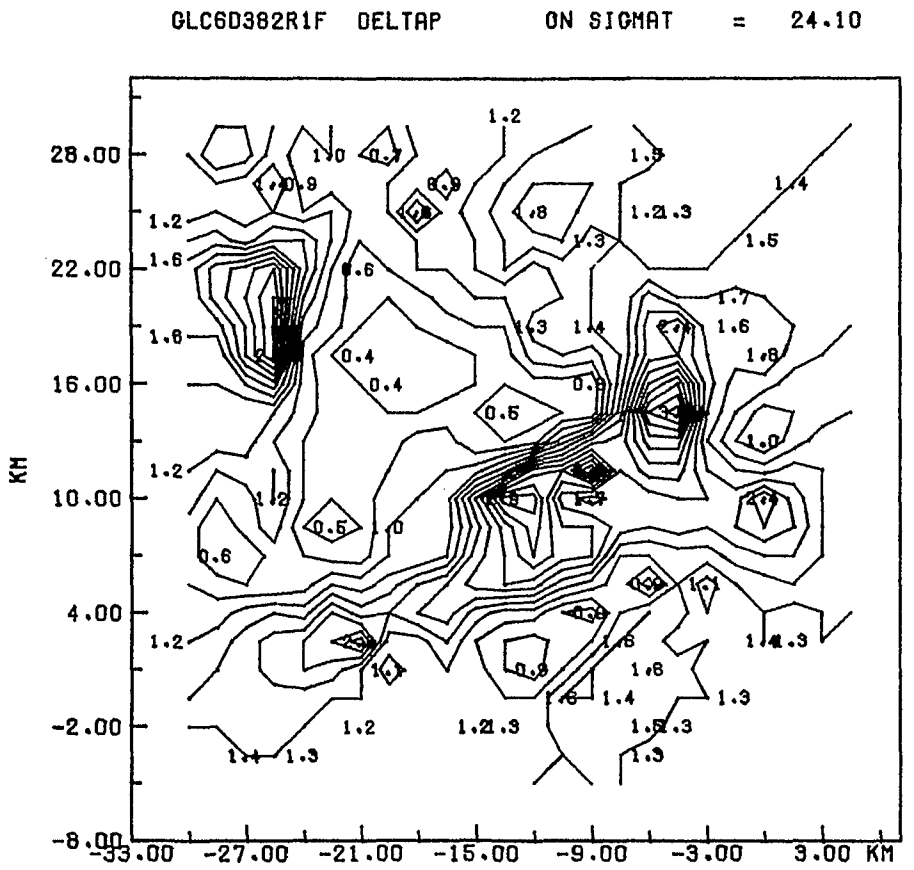


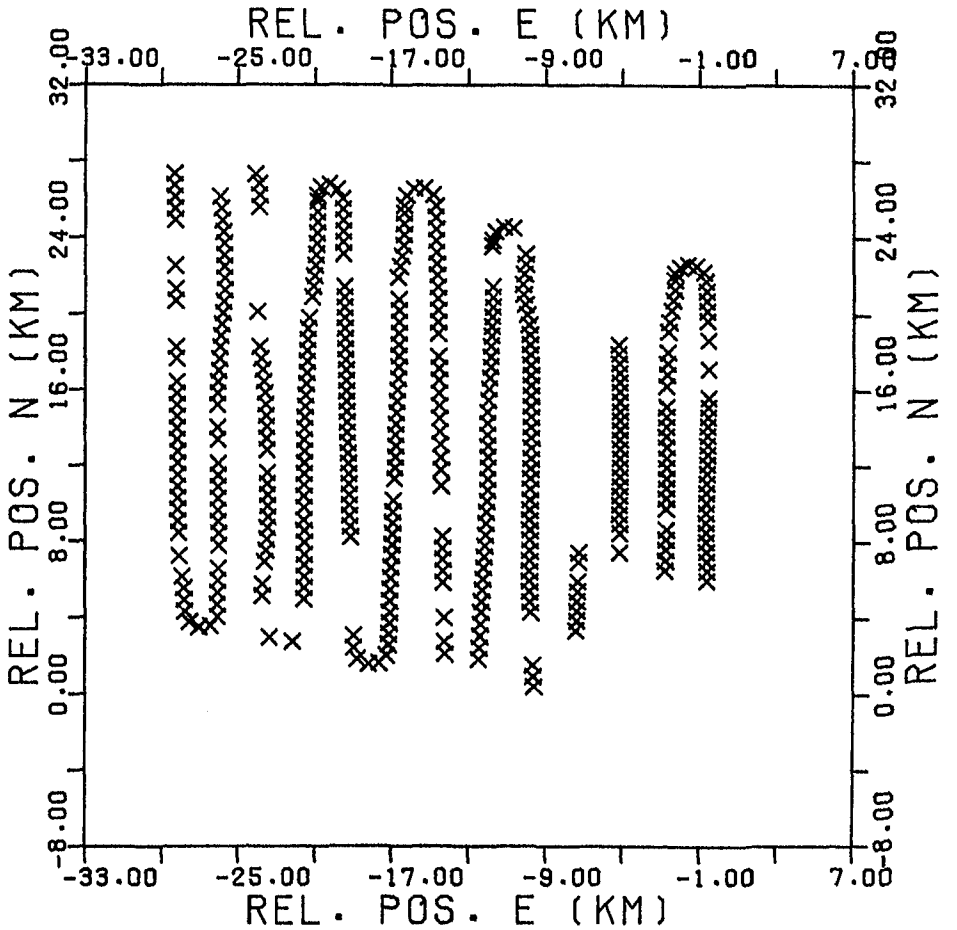


-Thickness between Isopycnic Surfaces-

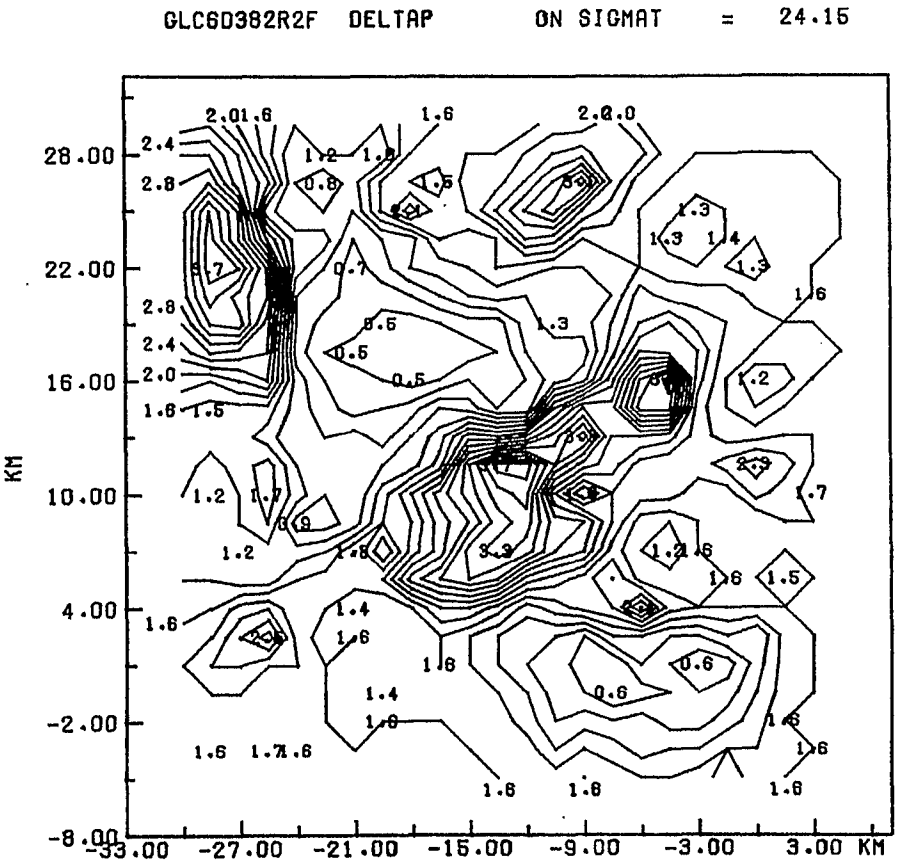


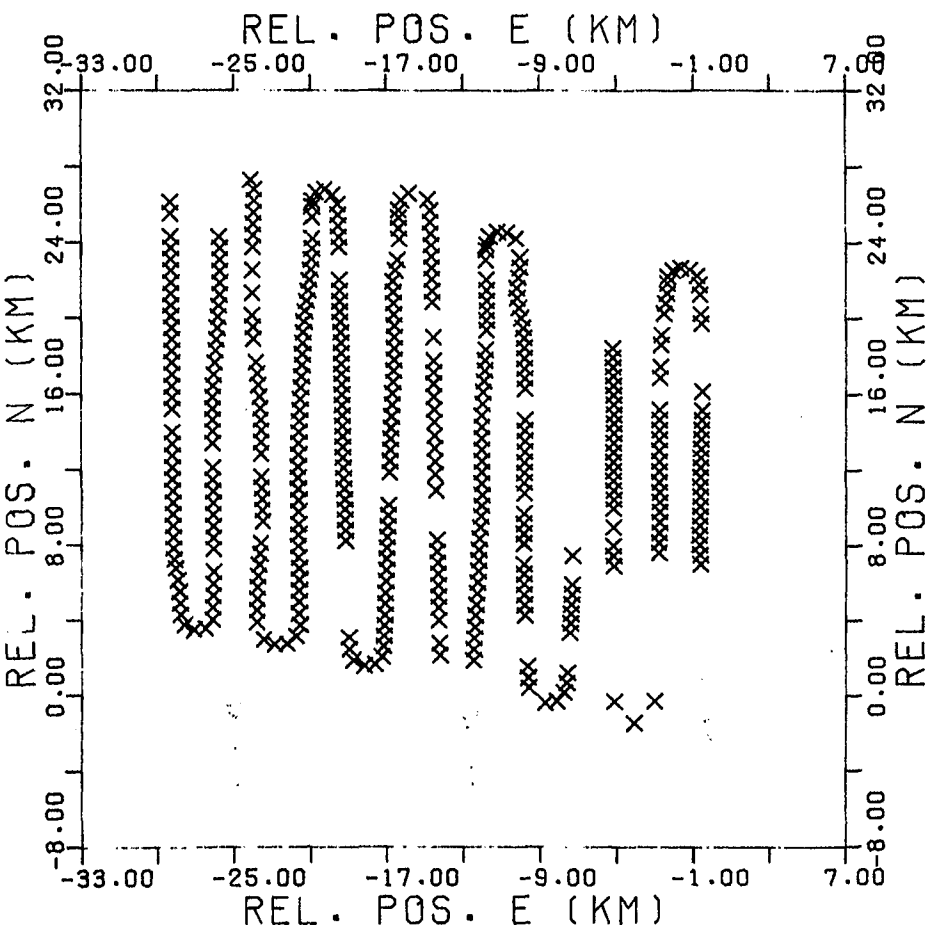
-Thickness between Isopycnic Surfaces-



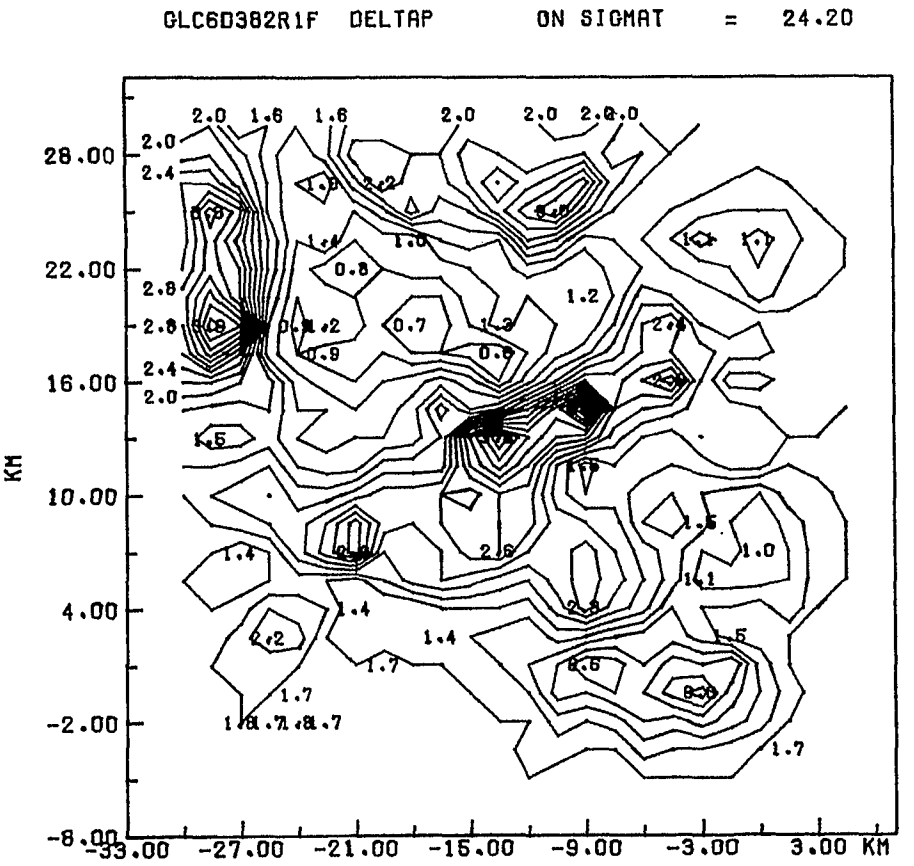


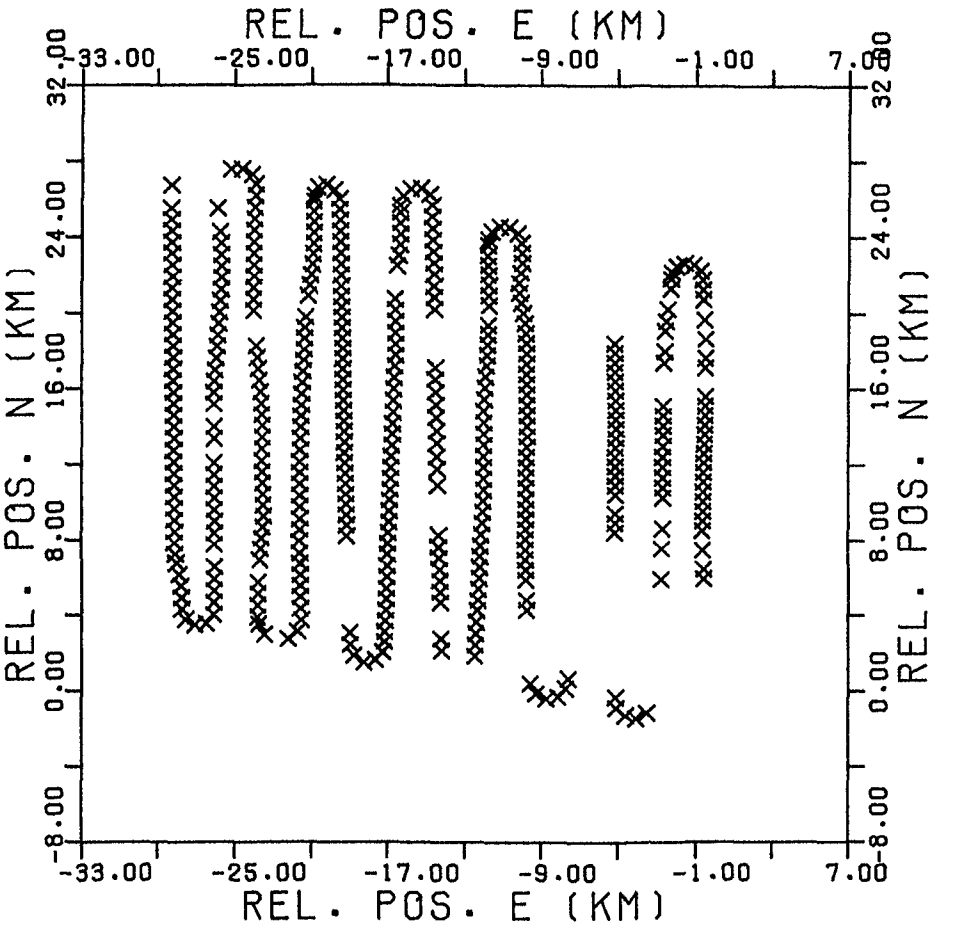
-Thickness between Isopycnic Surfaces-



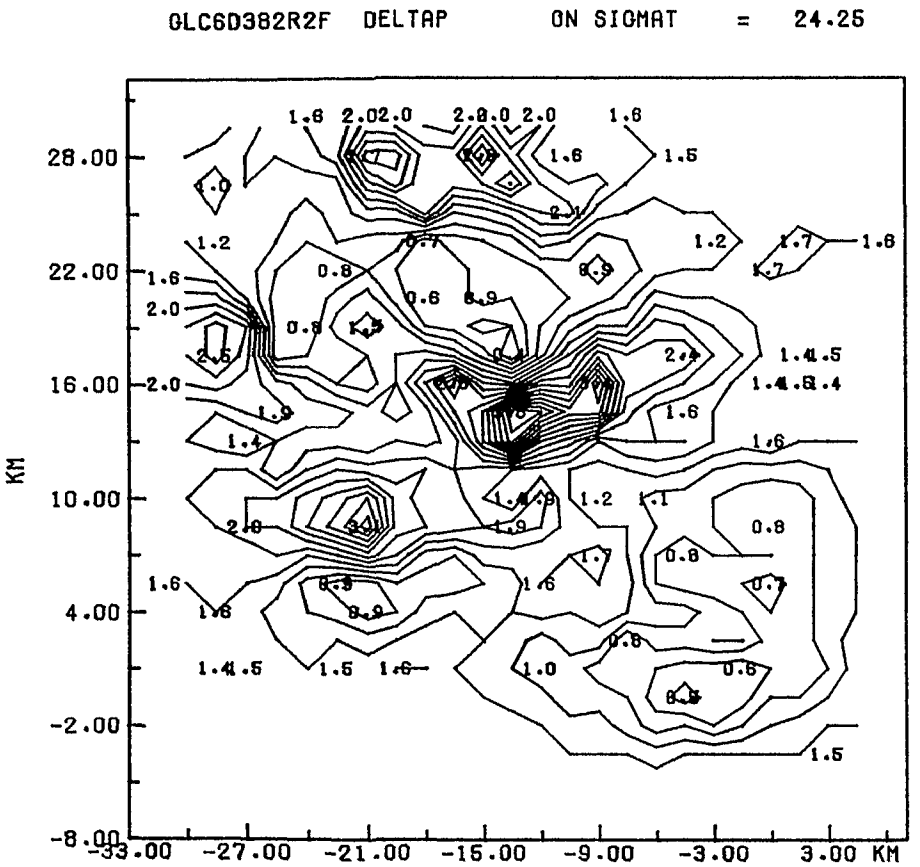


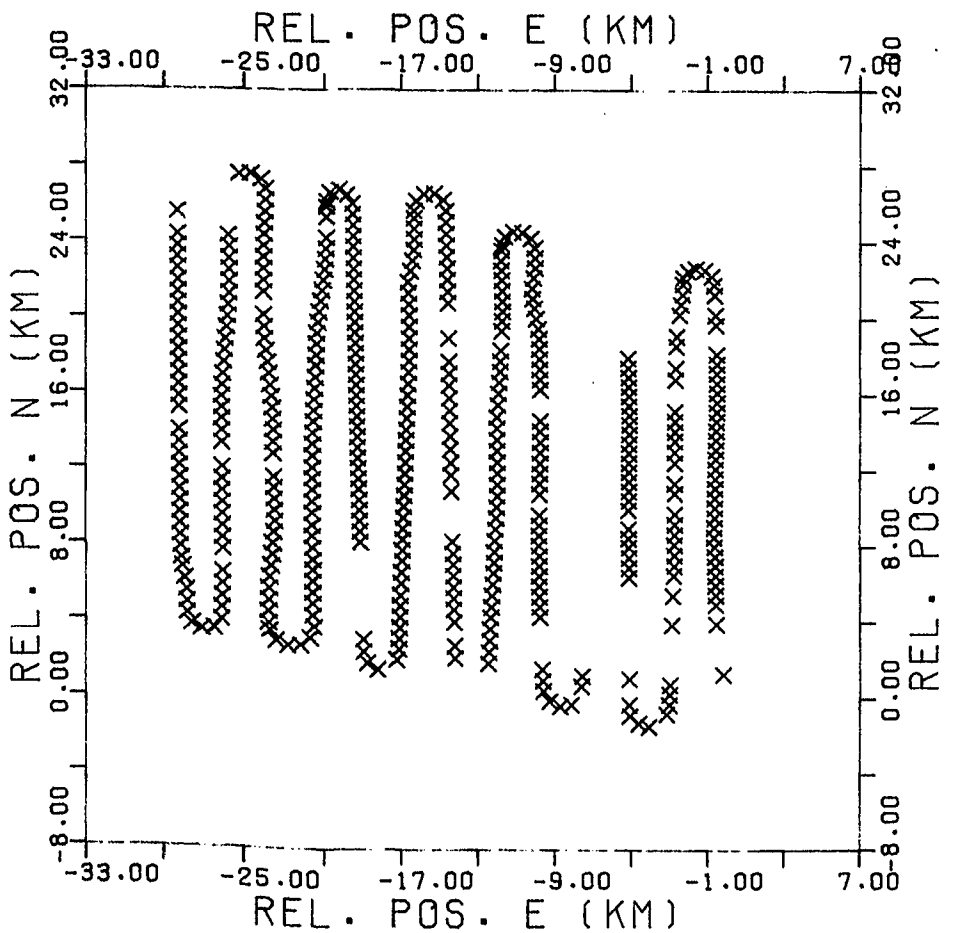
-Thickness between Isopycnic Surfaces-



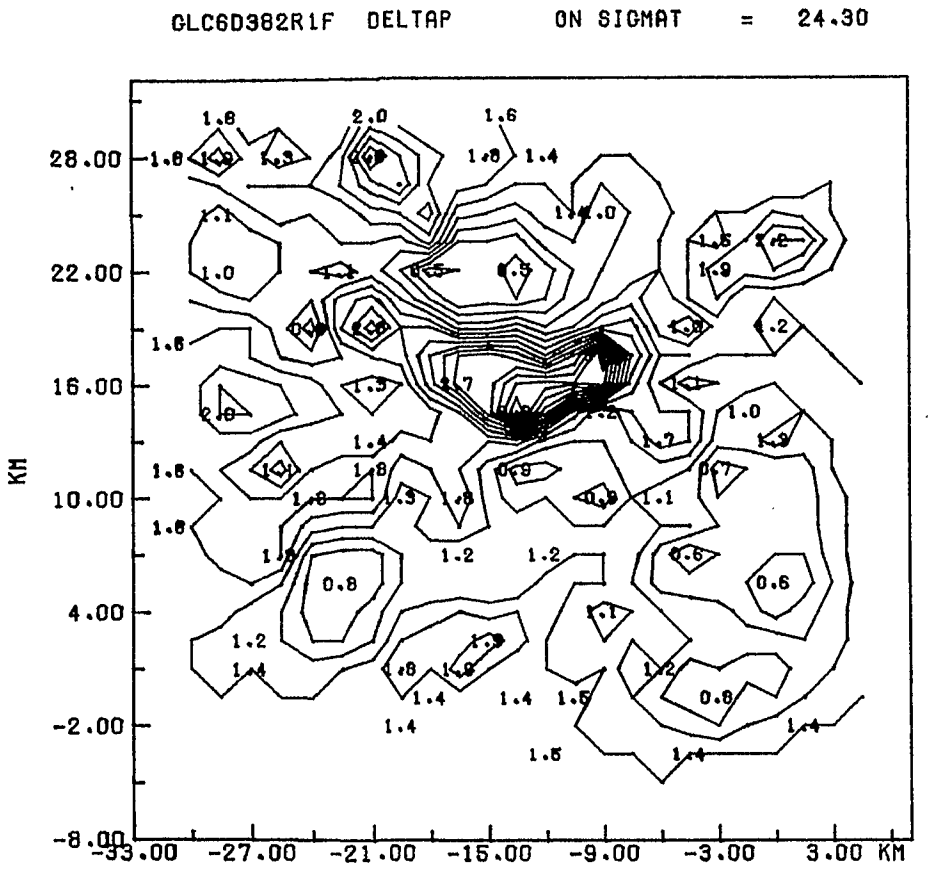


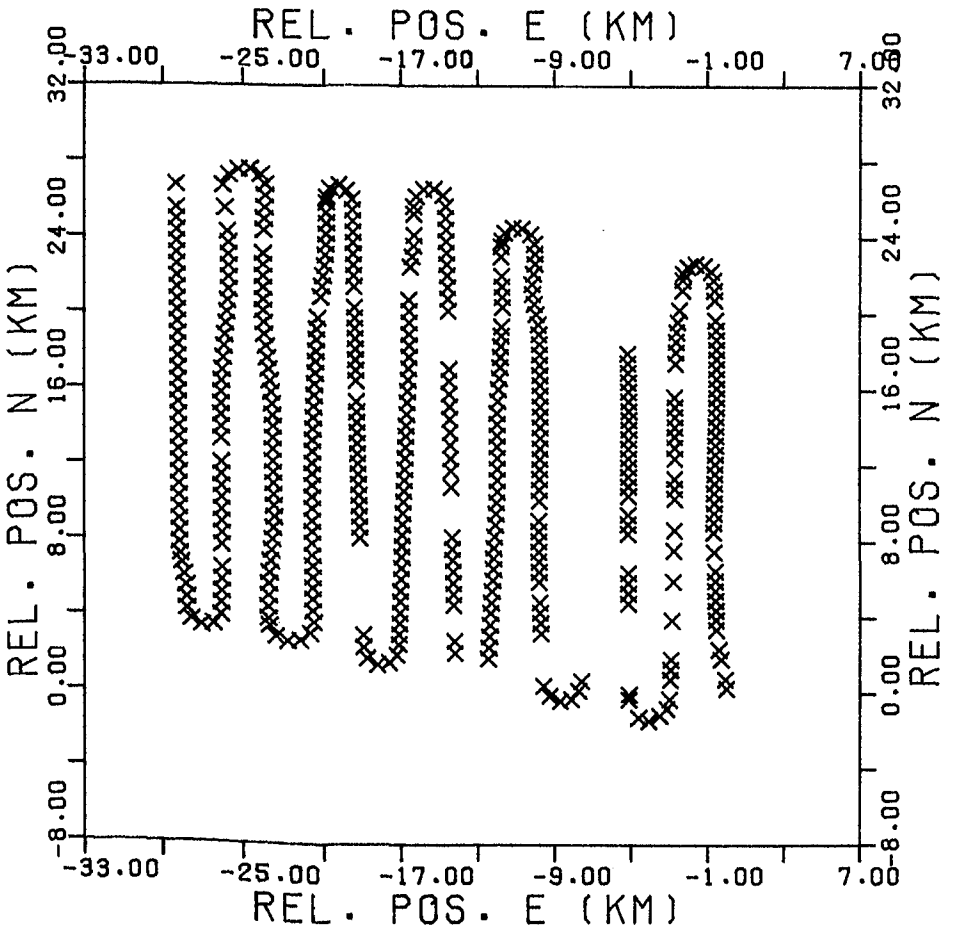
-Thickness between Isopycnic Surfaces-



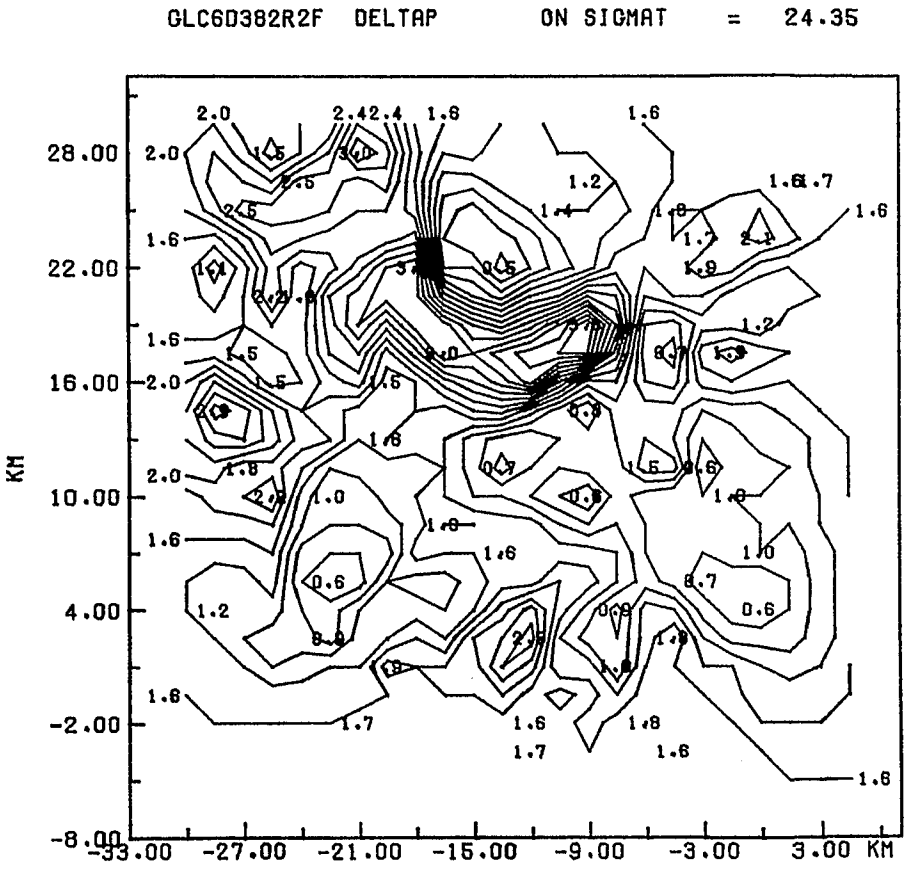


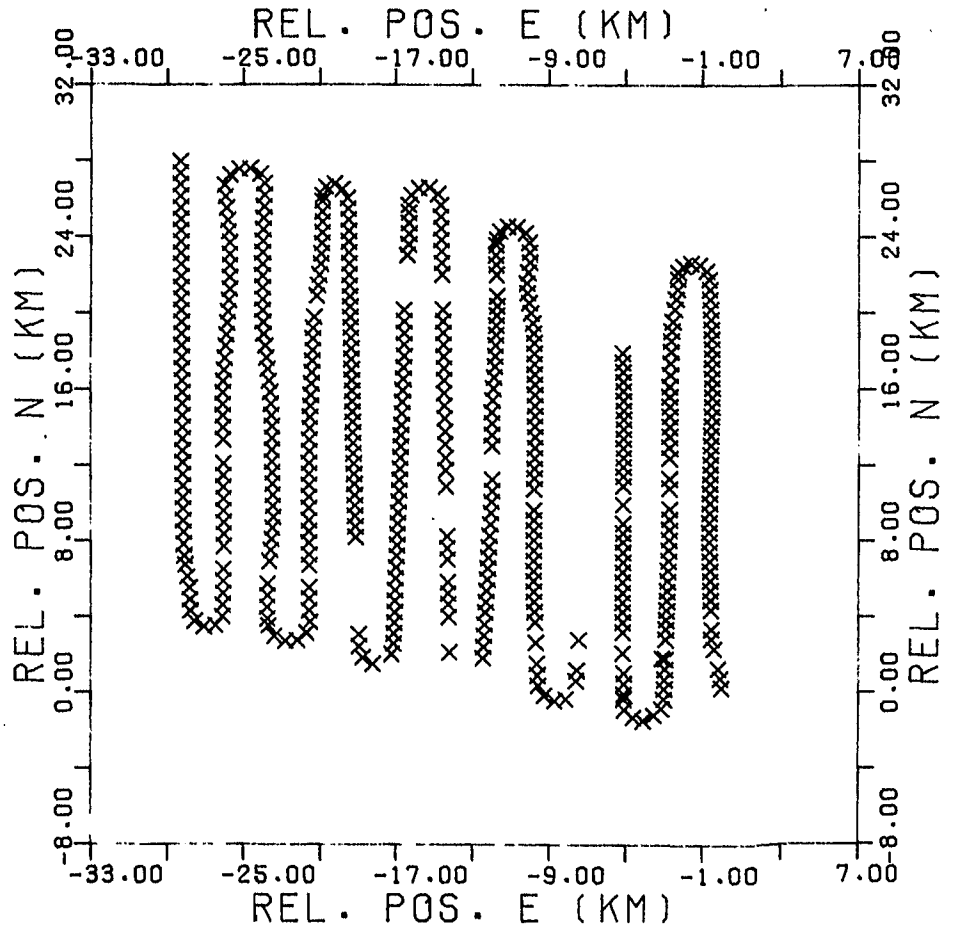
-Thickness between Isopycnic Surfaces-



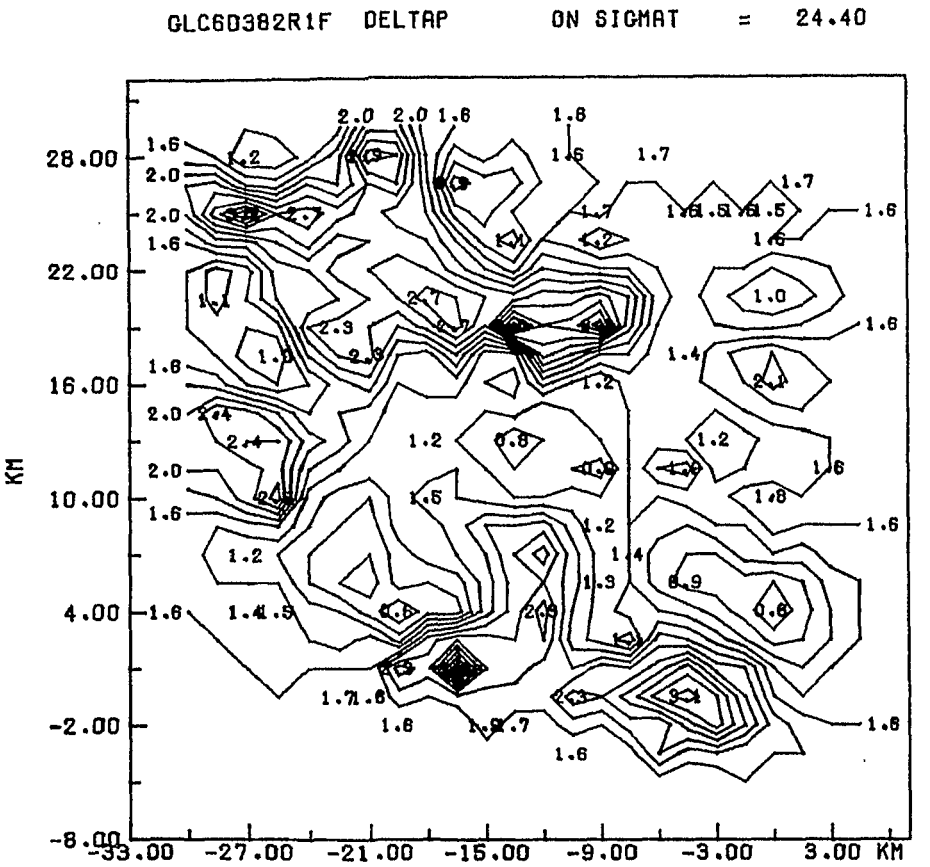


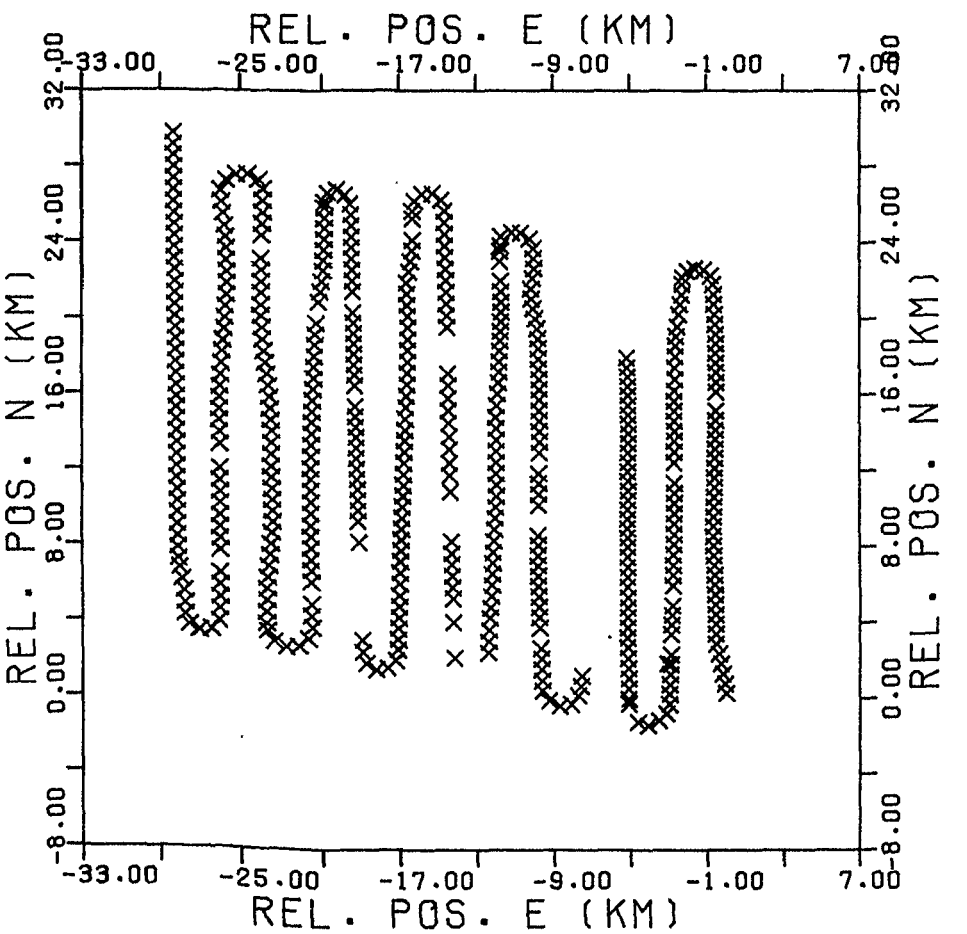
-Thickness between Isopycnic Surfaces-



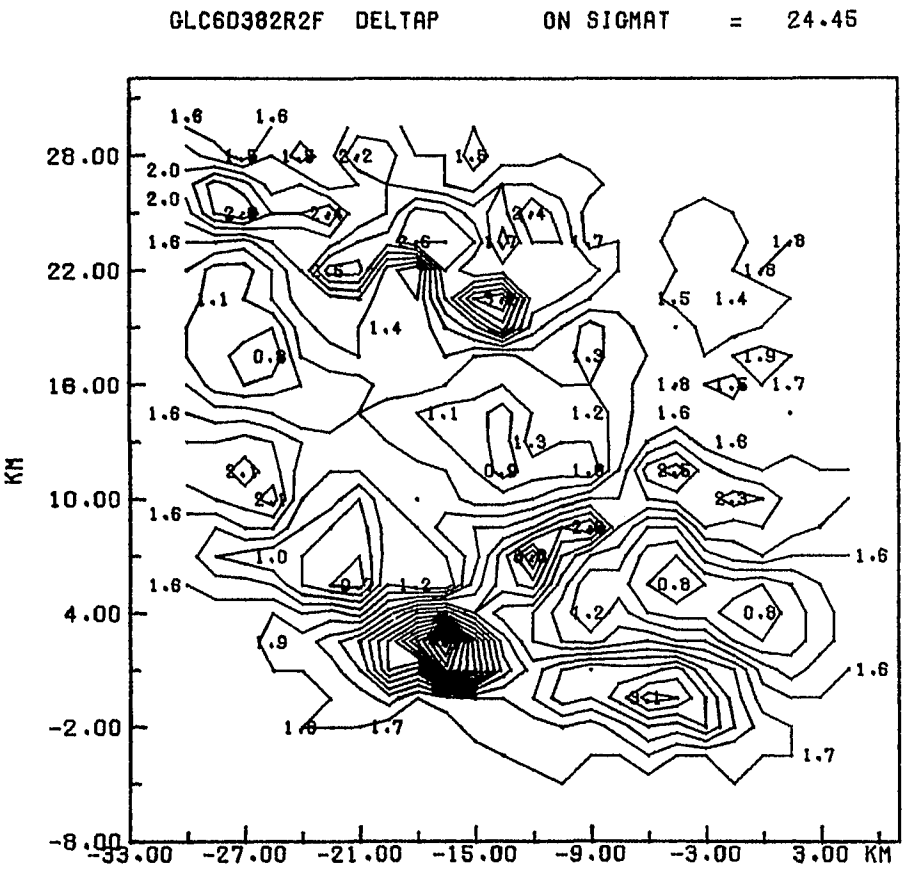


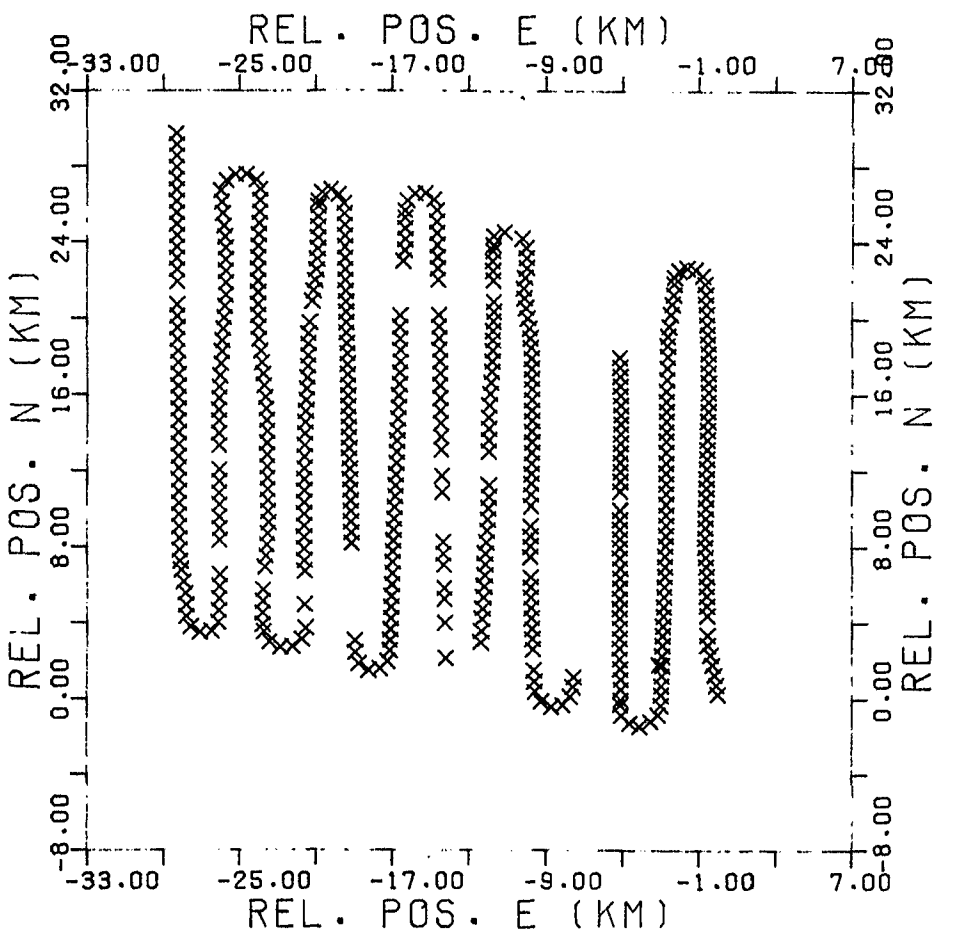
-Thickness between Isopycnic Surfaces-



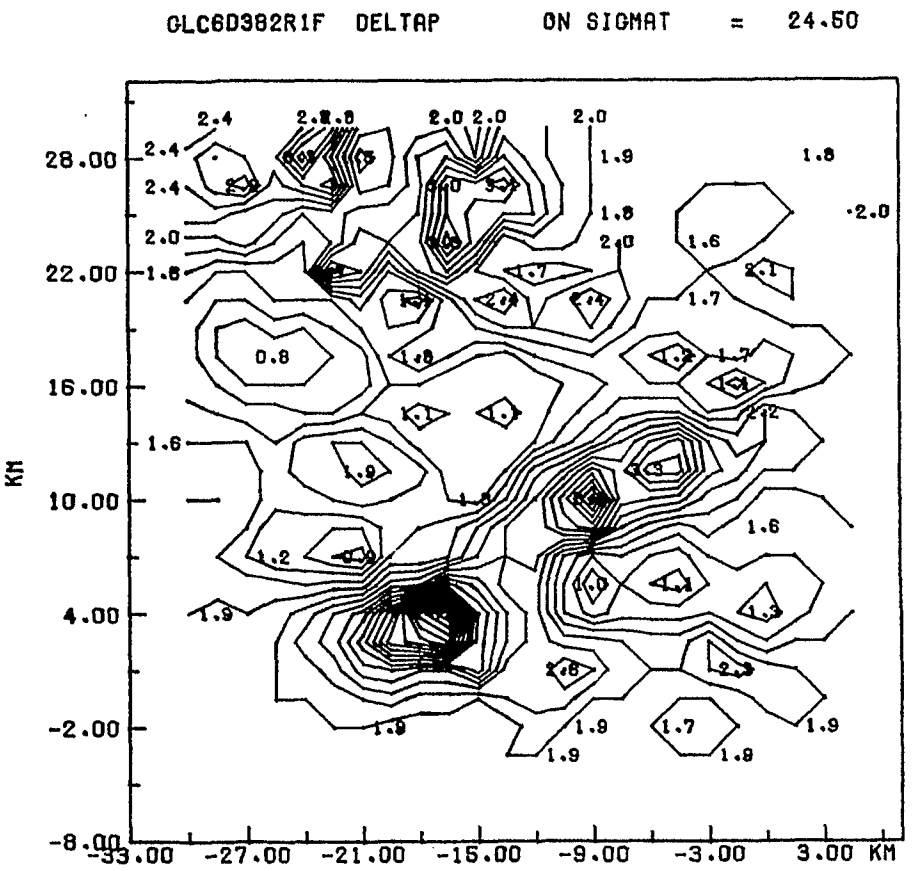


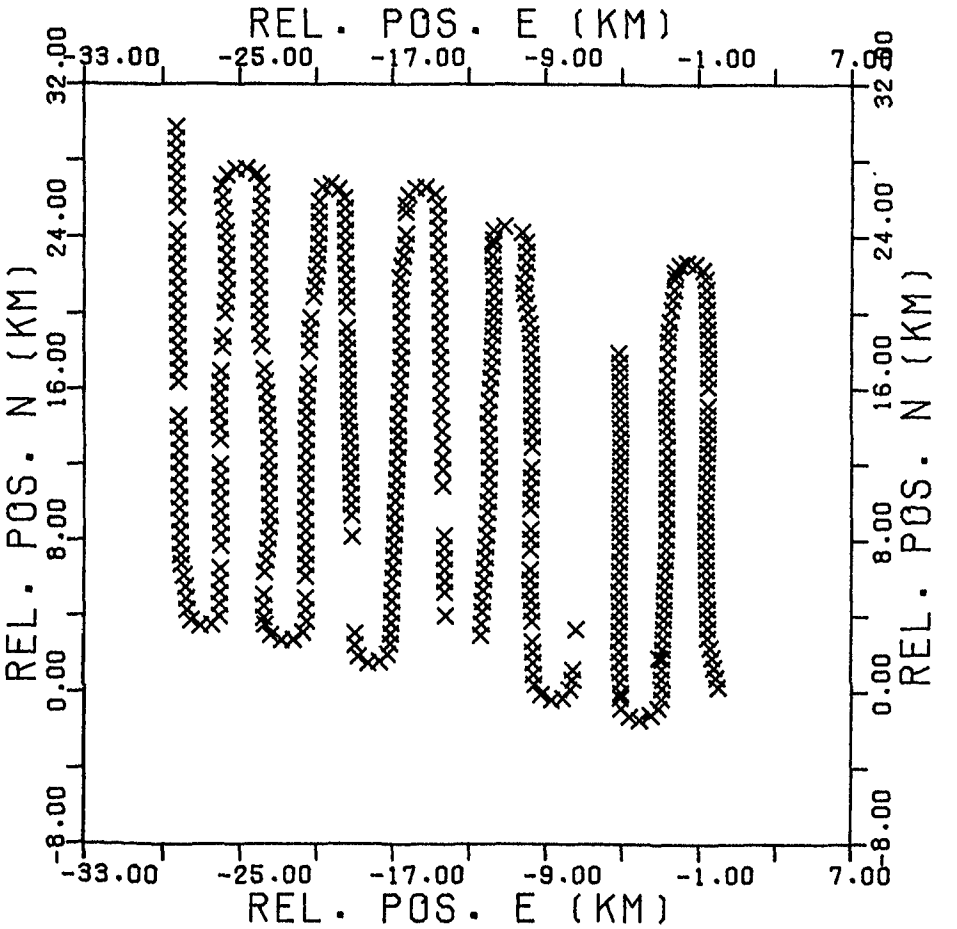
-Thickness between Isopycnic Surfaces-



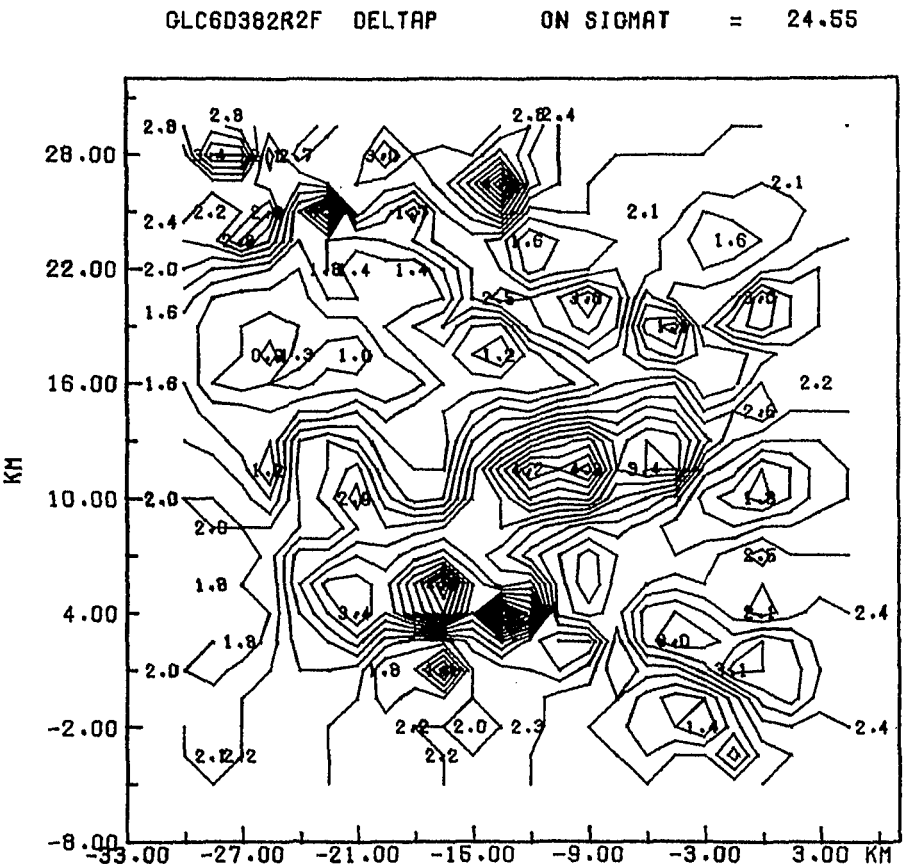


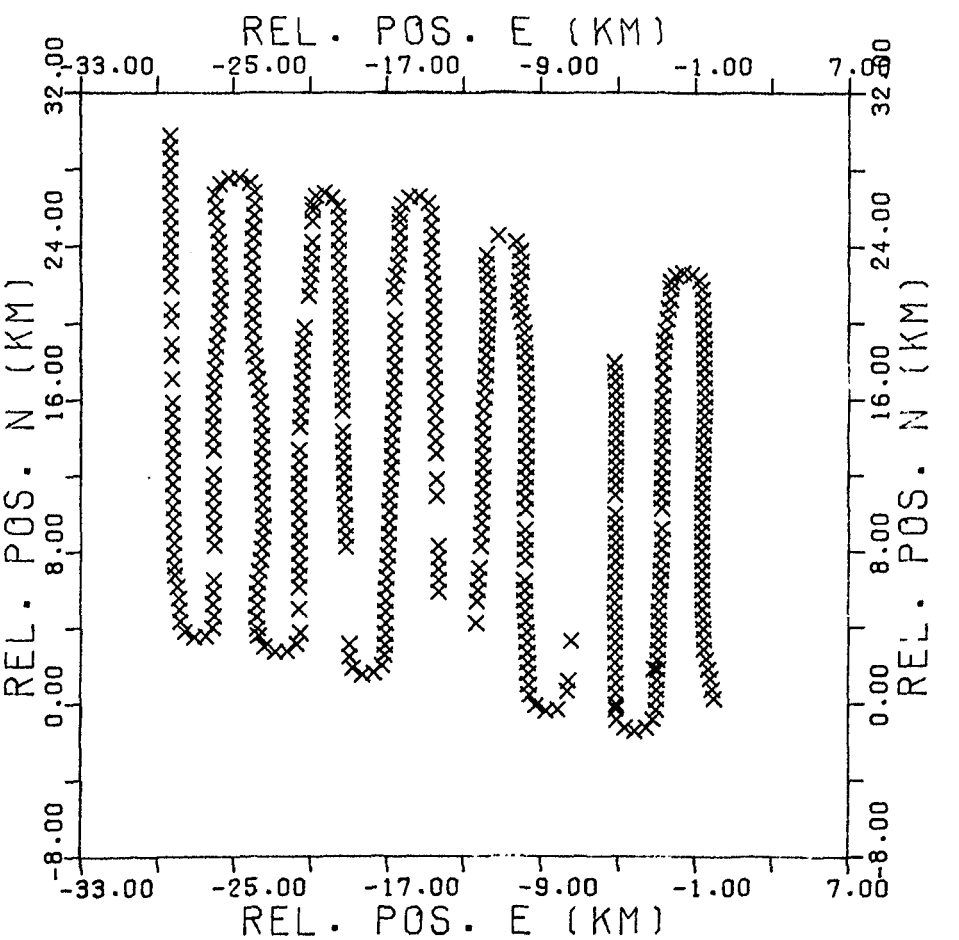
-Thickness between Isopycnic Surfaces-



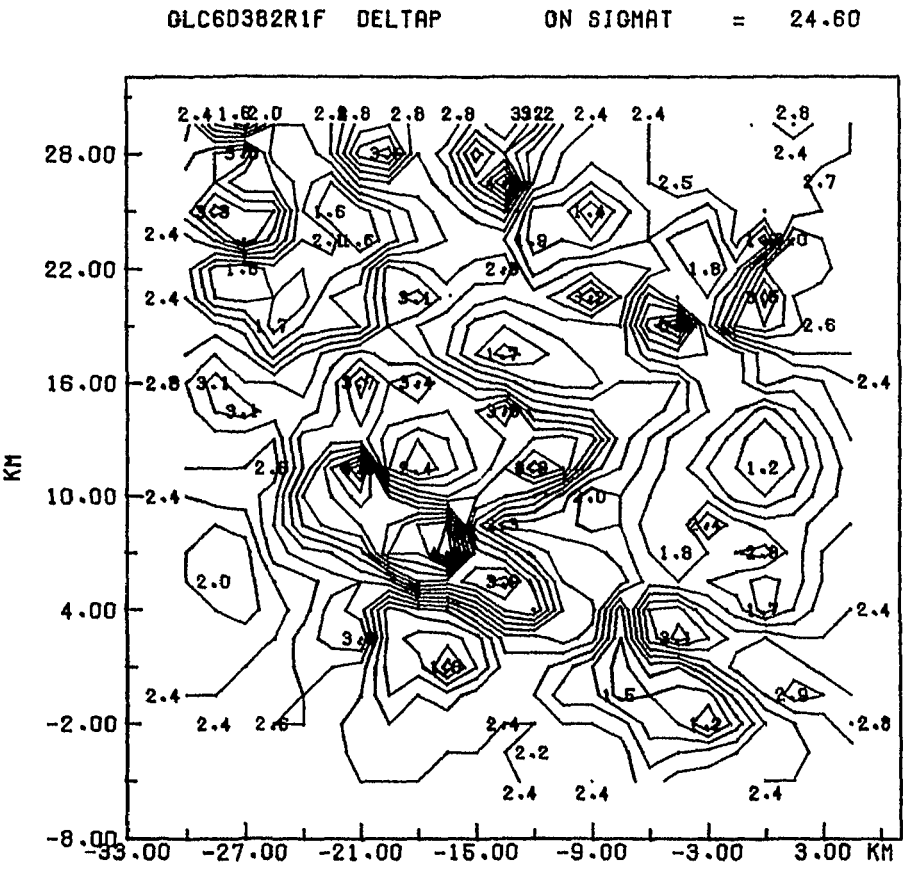


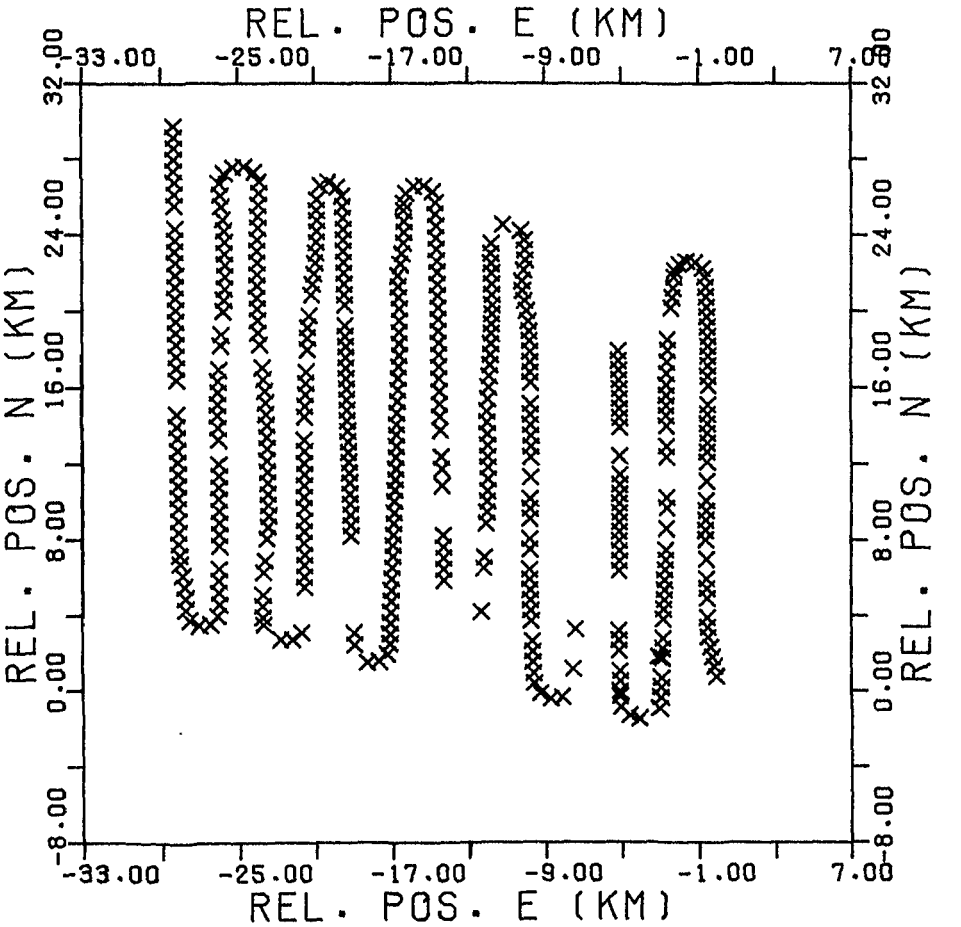
-Thickness between Isopycnic Surfaces-



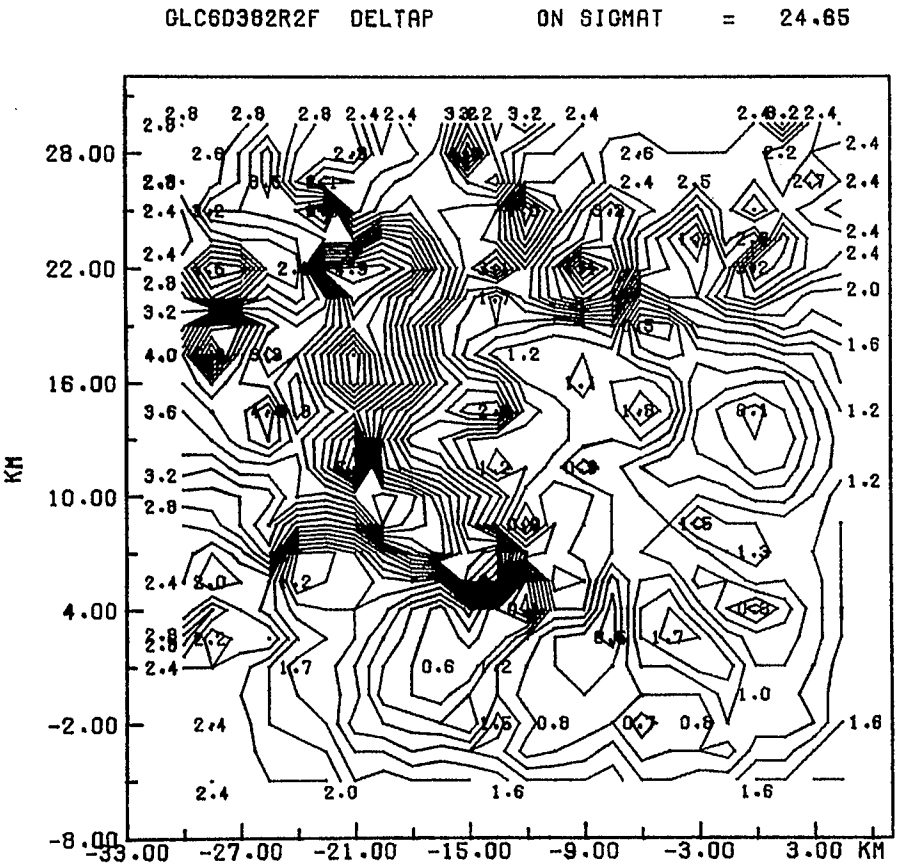


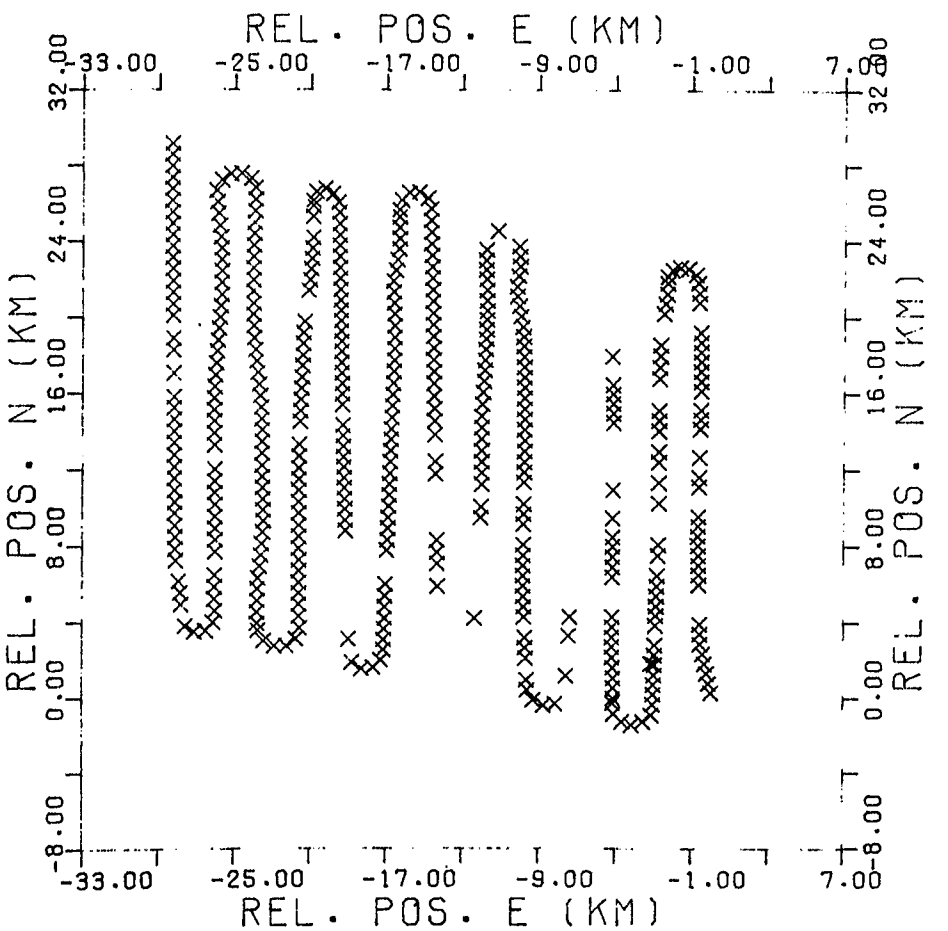
-Thickness between Isopycnic Surfaces-





-Thickness between Isopycnic Surfaces-





-Thickness between Isopycnic Surfaces-

SECTION VI ISOBARIC MAPS

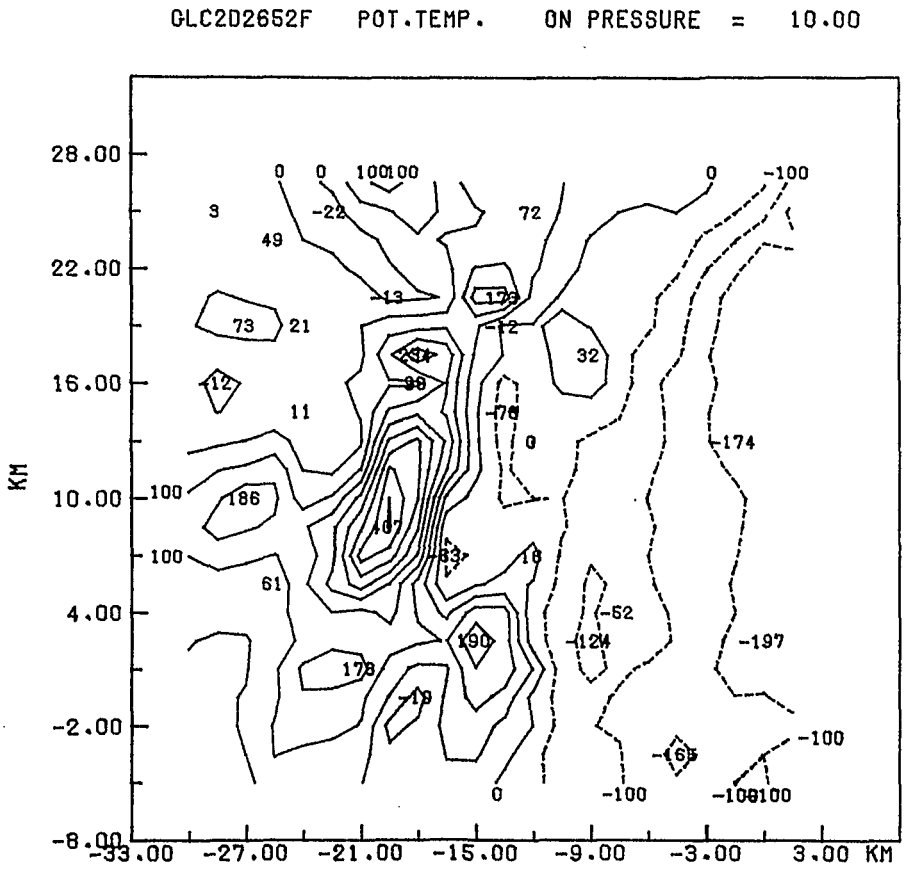
This section shows contoured maps of potential temperature, salinity and density (σ_t) on surfaces of constant pressure in the range 10.00 to 24.00 dbar.

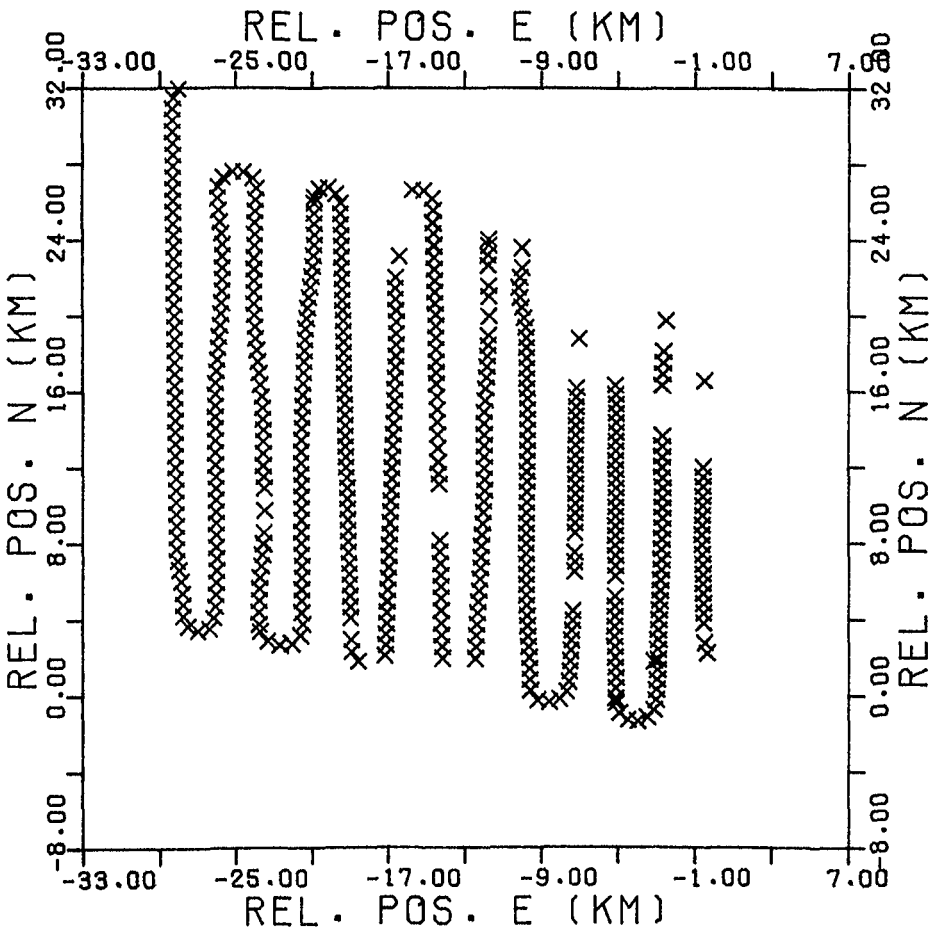
The data are the product of the objective analysis, the data being interpolated onto a regular east-west, north-south grid. The positions of the data (relative to the origin of the map) in the objective analysis are shown together with each surface. These maps are mainly in the upper layer of weak density gradient, often called the mixed layer.

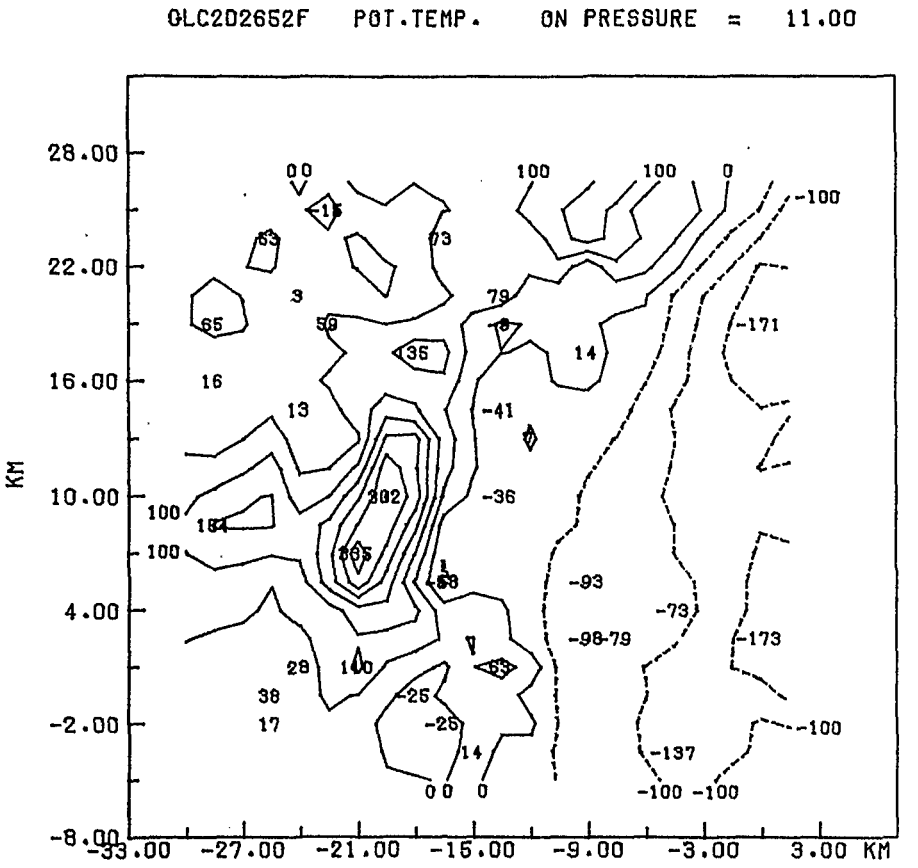
1. Contoured maps of potential temperature on surfaces of constant pressure in the range 10 to 24 dbar. The contours are of the temperature deviation (units in 10^{-3} K) from the mean temperature on the surface, whose value is given in the following table. The contour interval is 50 mK. The surface interval is 1.0 dbar and the grid spacing in the objective analysis was 1.5 km. The maps have a scale of 1 : 400 000.

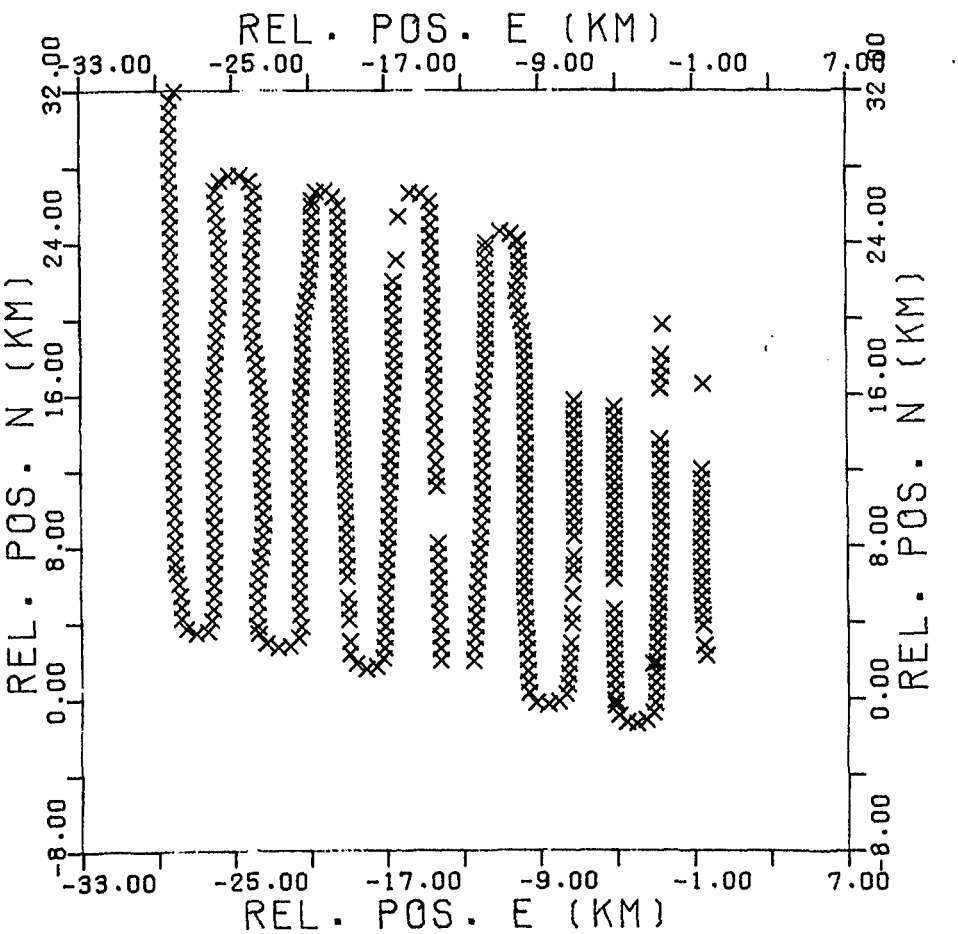
Table of subtracted mean values

Filename	GLC2D2652F	GLC2D2642F	GLC2D2662F
Pressure dbar	$\bar{\theta}$[° C]	$\bar{S}$[ppt]	$\bar{\sigma}_t$
10	27.029	35.563	23.153
11	27.007	35.565	23.161
12	26.982	35.566	23.170
13	26.973	35.568	23.173
14	26.965	35.570	23.177
15	26.960	35.571	23.180
16	26.955	35.572	23.182
17	26.952	35.574	23.184
18	26.948	35.575	23.186
19	26.946	35.576	23.188
20	26.943	35.578	23.190
21	26.491	35.580	23.191
22	26.941	35.582	23.193
23	26.940	35.586	23.196
24	26.937	35.590	23.201


GLC2D2652F POT.TEMP. ON PRESSURE = 10.00
KM
28.00
22.00
16.00
10.00
4.00
-2.00
-8.00
-33.00
-27.00
-21.00
-15.00
-9.00
-3.00
3.00 KM

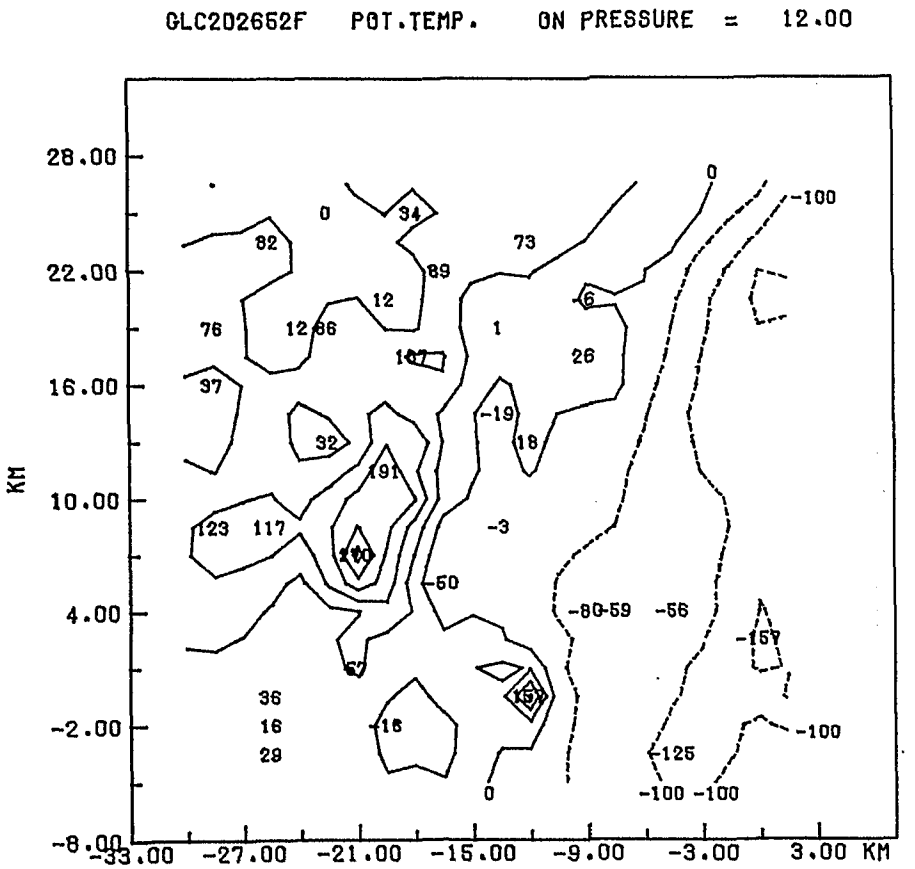

REL. POS. E (KM)
-33.00
-25.00
-17.00
-9.00
-1.00
7.00
REL. POS. N (KM)
32.00
24.00
16.00
8.00
0.00
-8.00

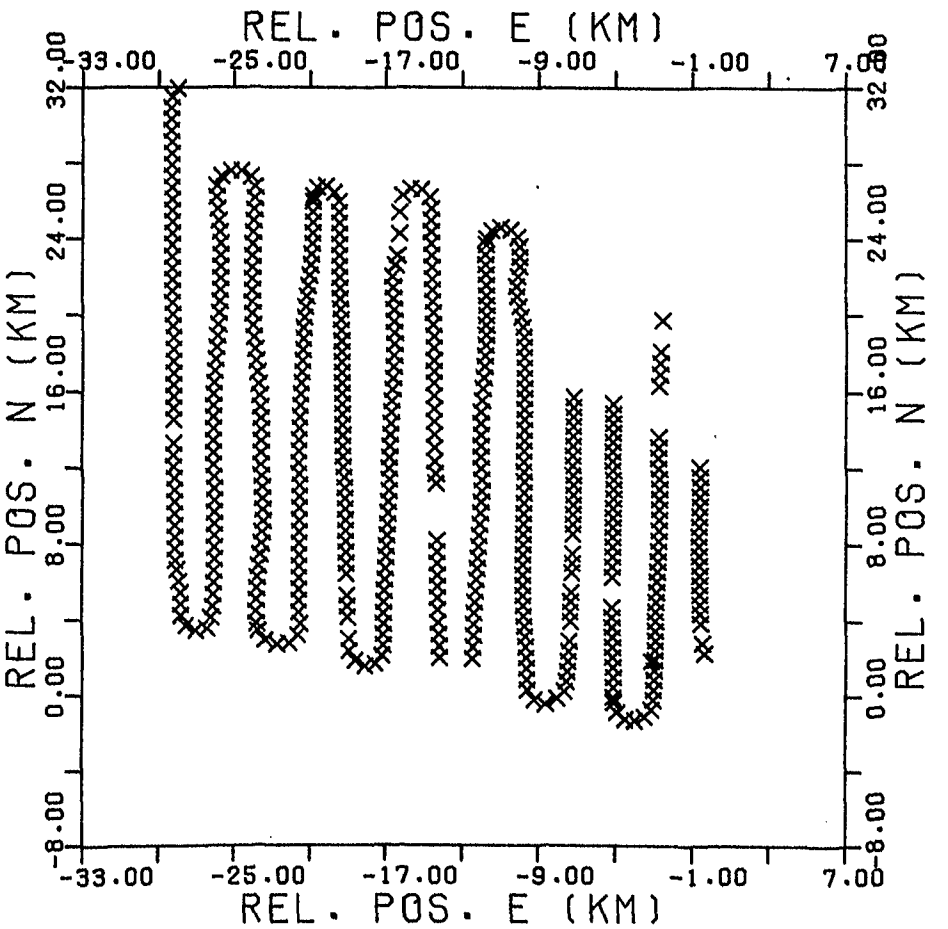


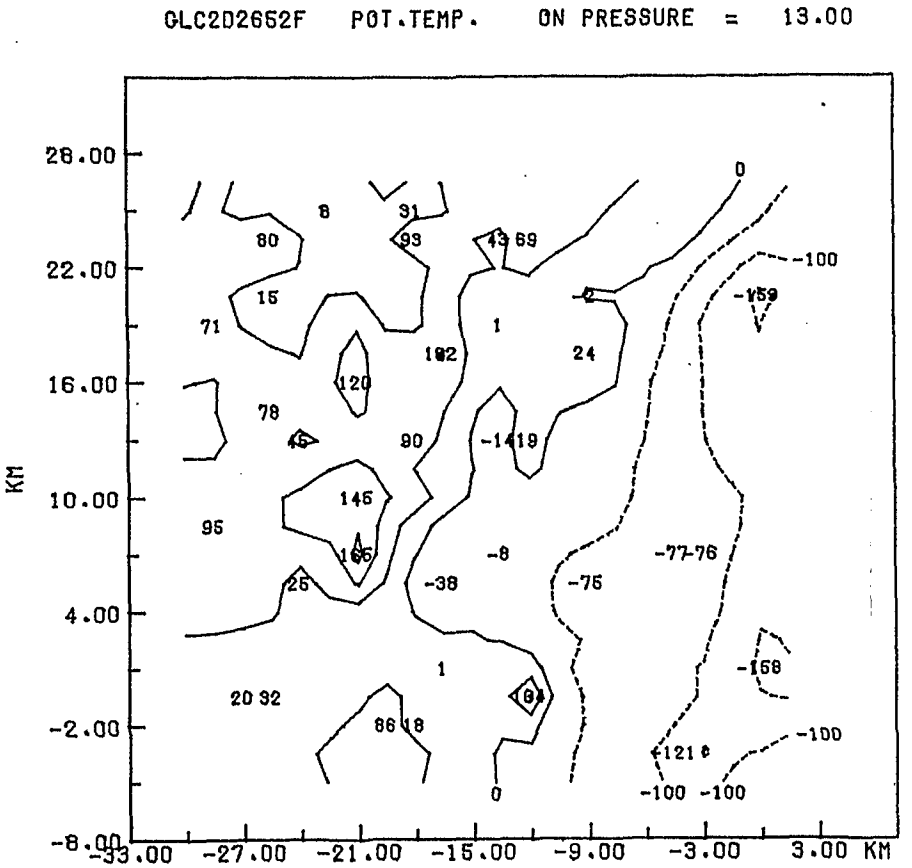


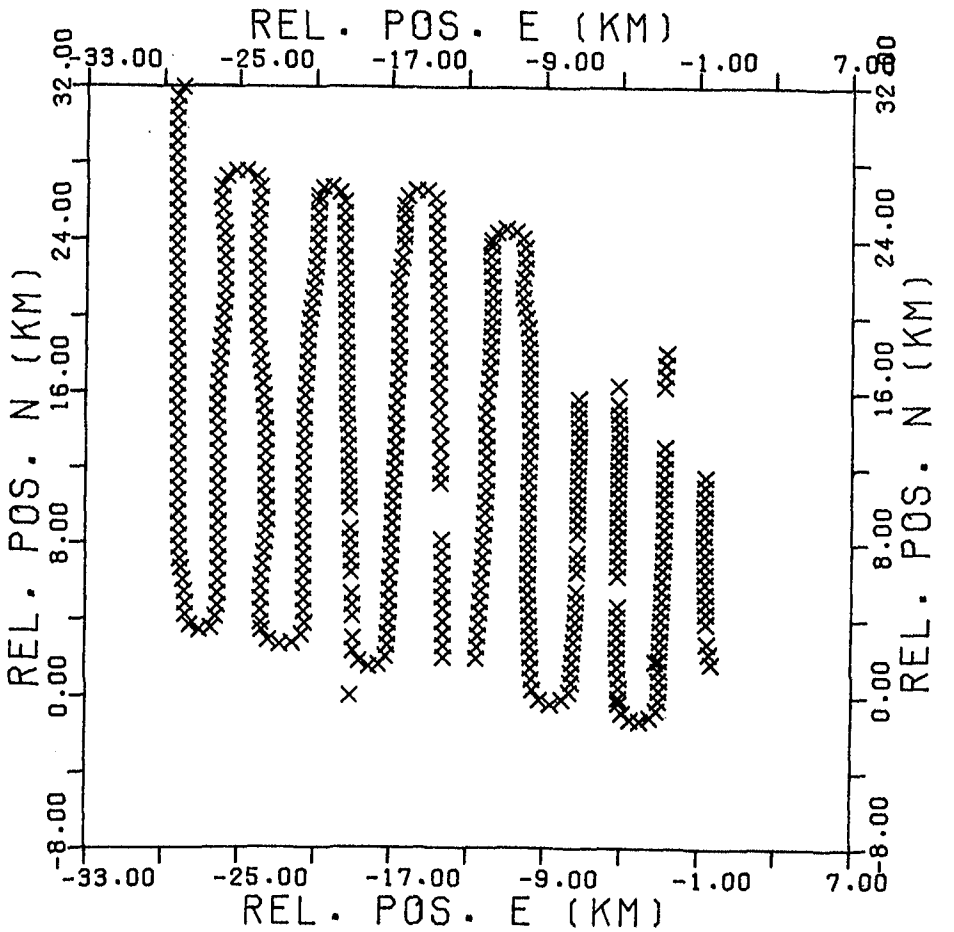
-Potential Temperature on Isobaric Surfaces-

-Potential Temperature on Isobaric Surfaces-

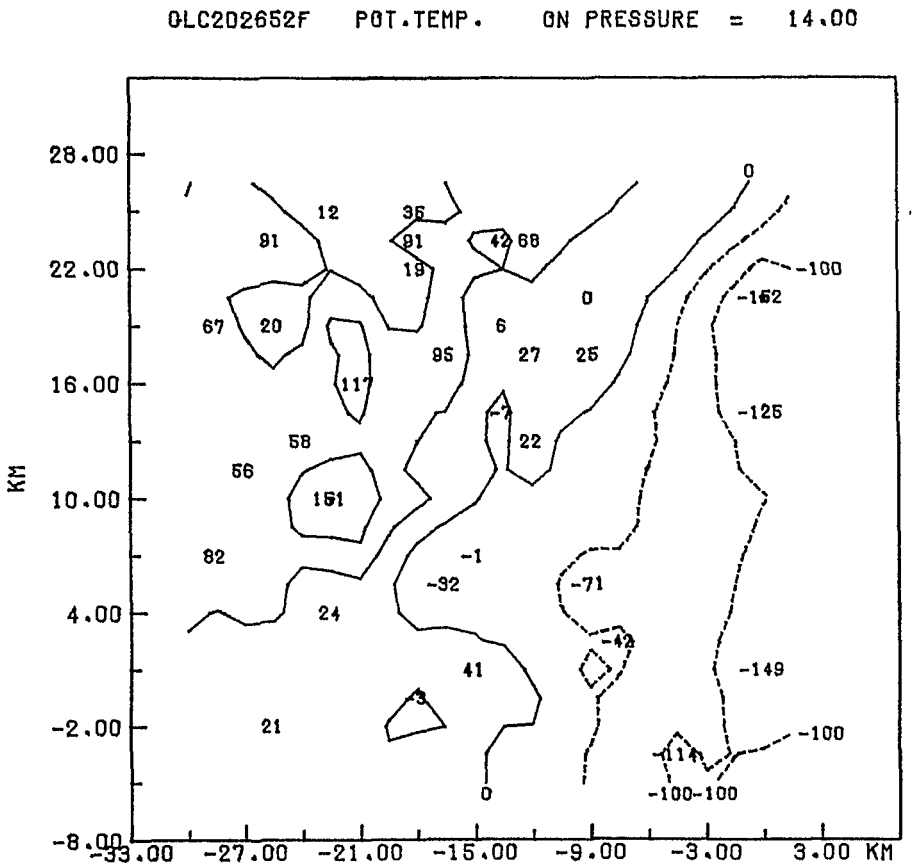


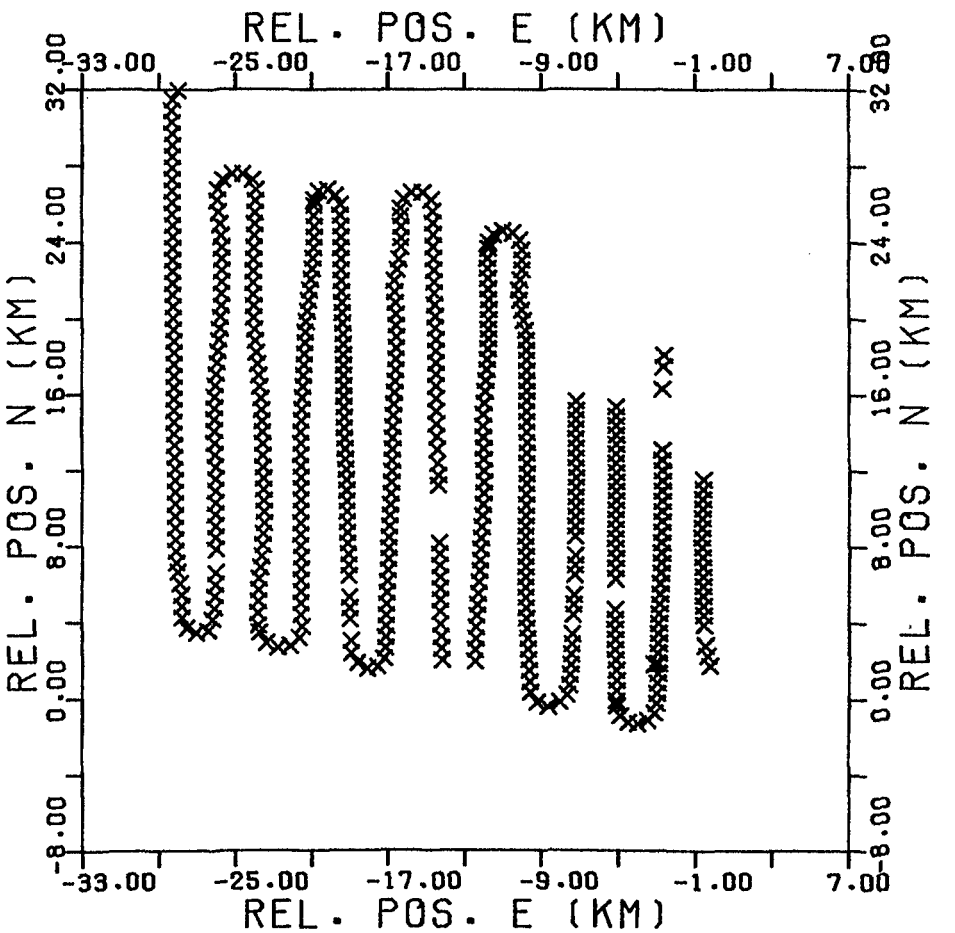




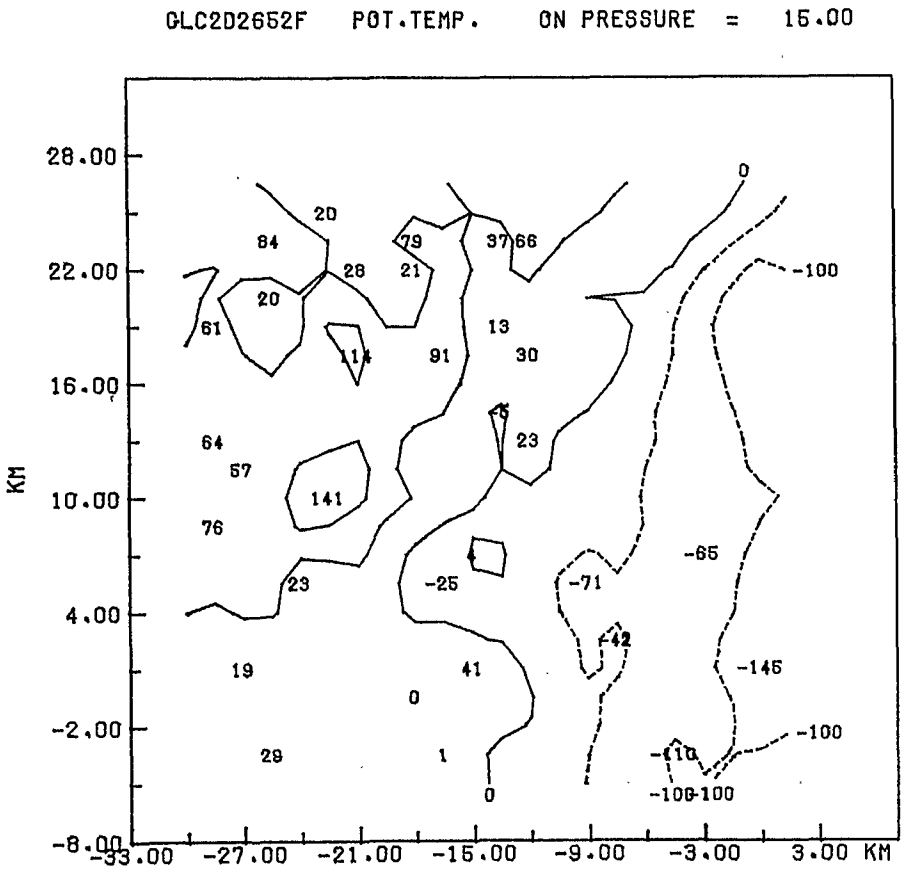


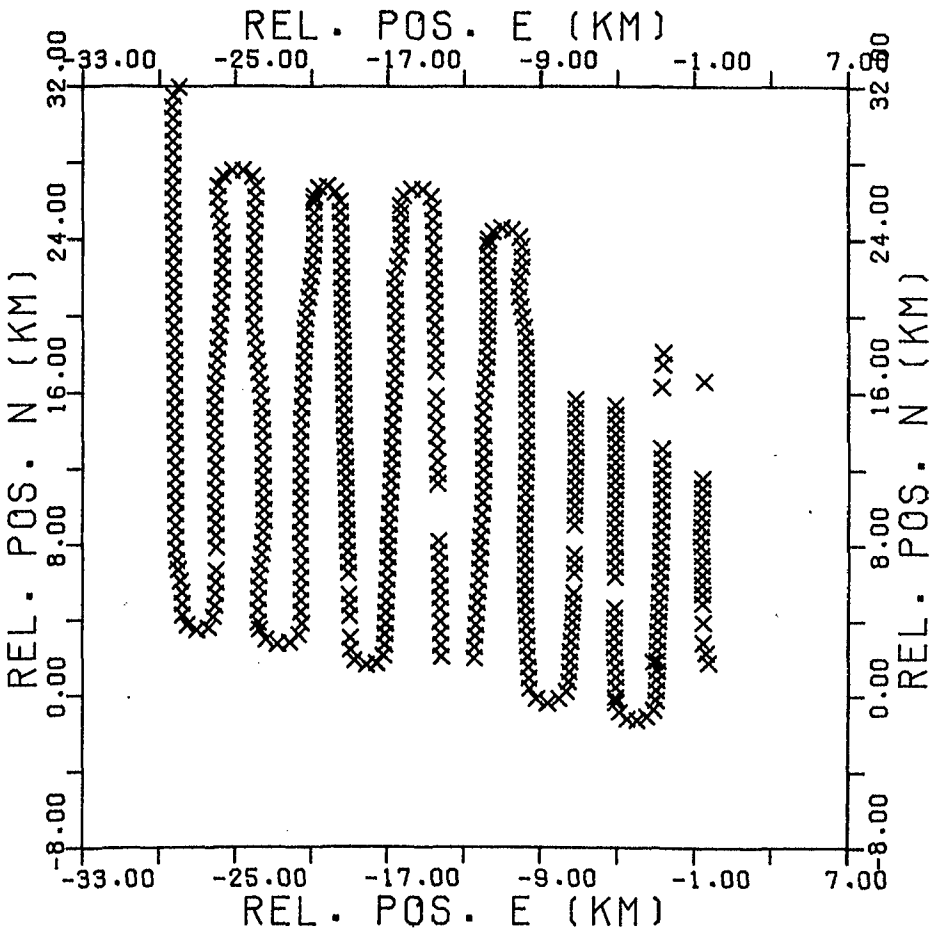
-Potential Temperature on Isobaric Surfaces-



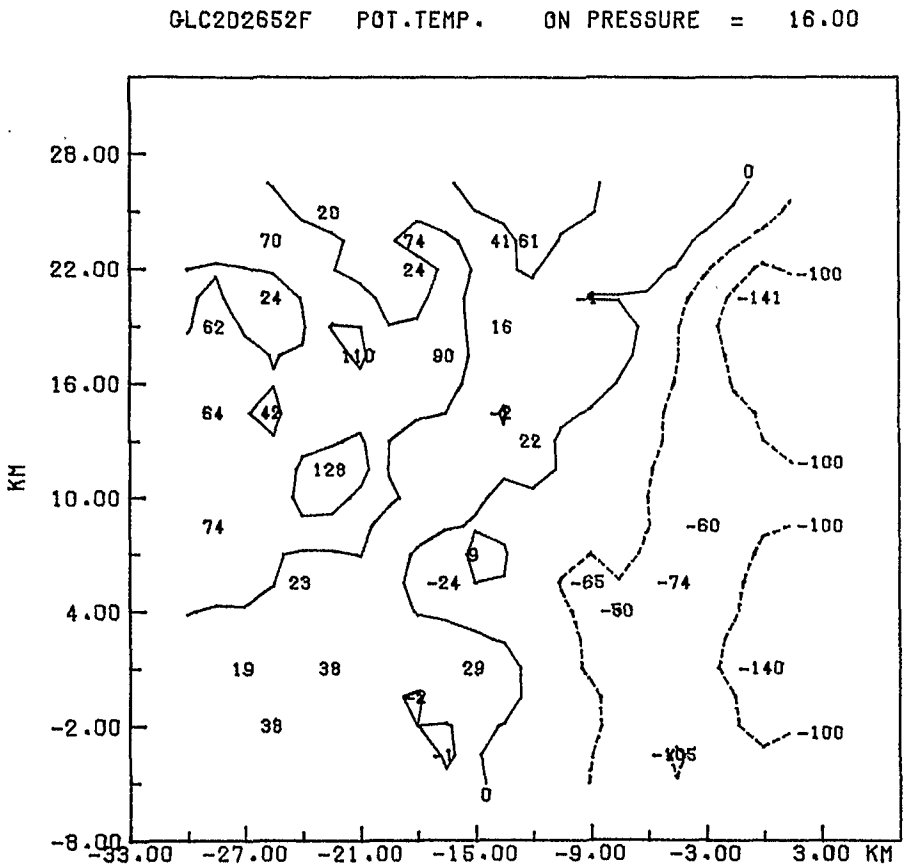


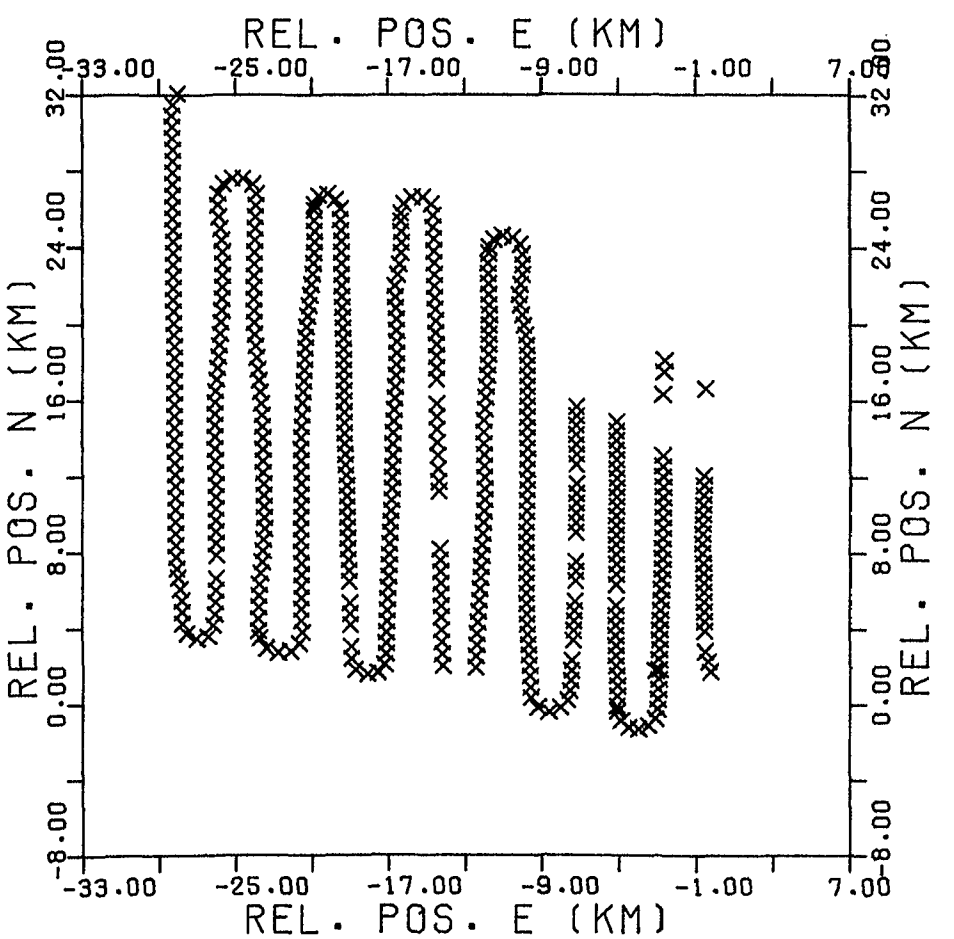
-Potential Temperature on Isobaric Surfaces-



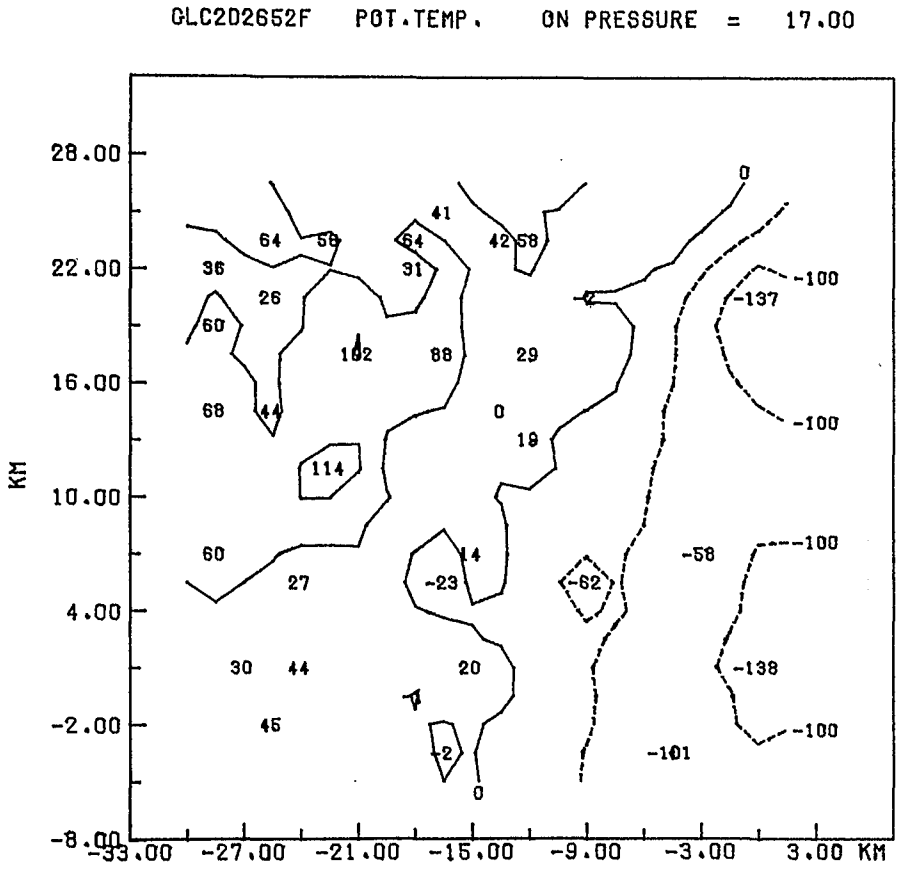


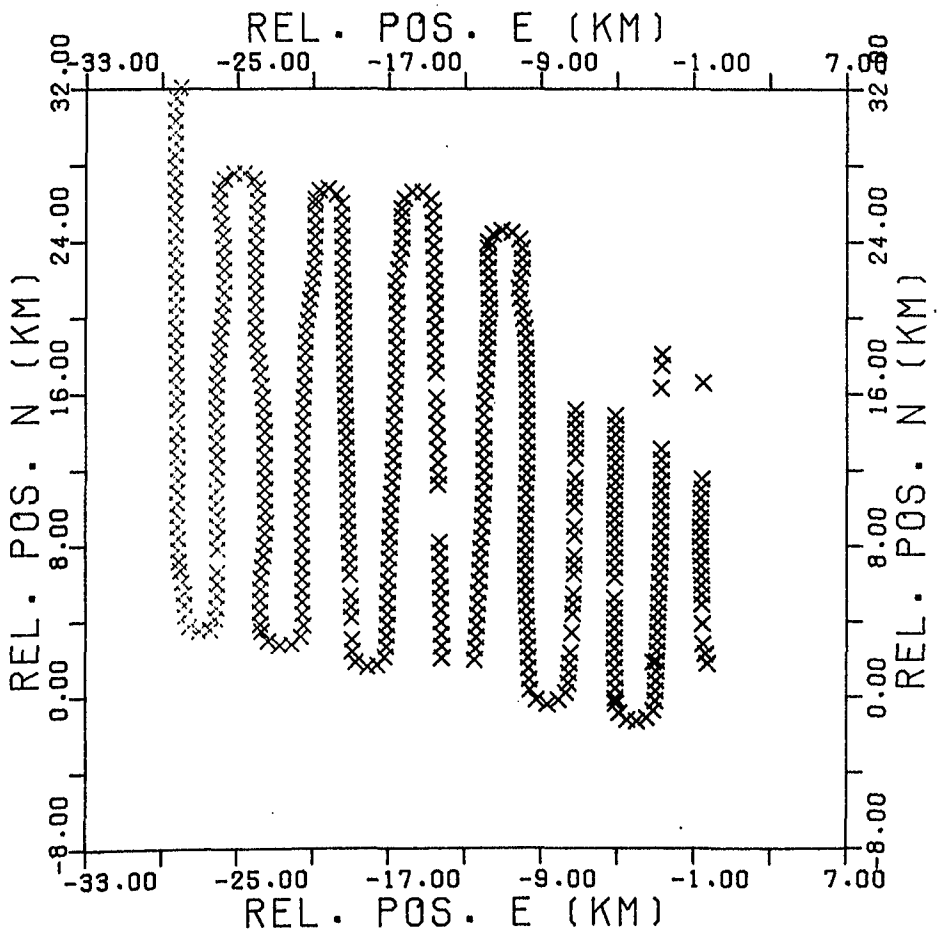
-Potential Temperature on Isobaric Surfaces-

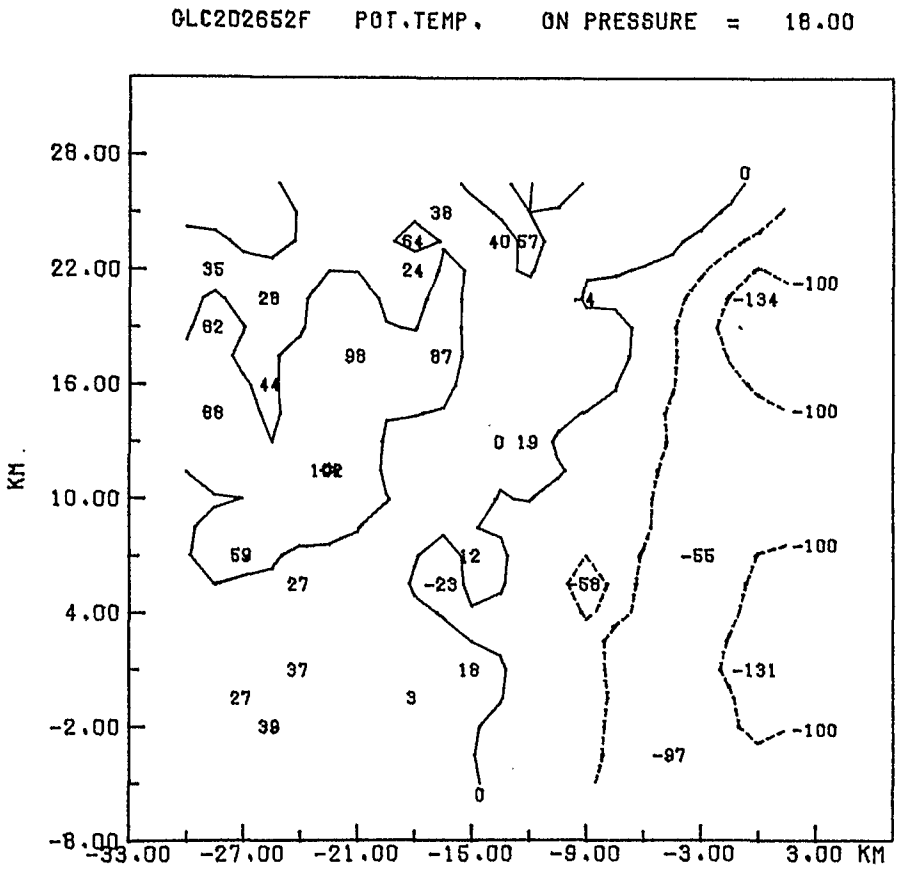


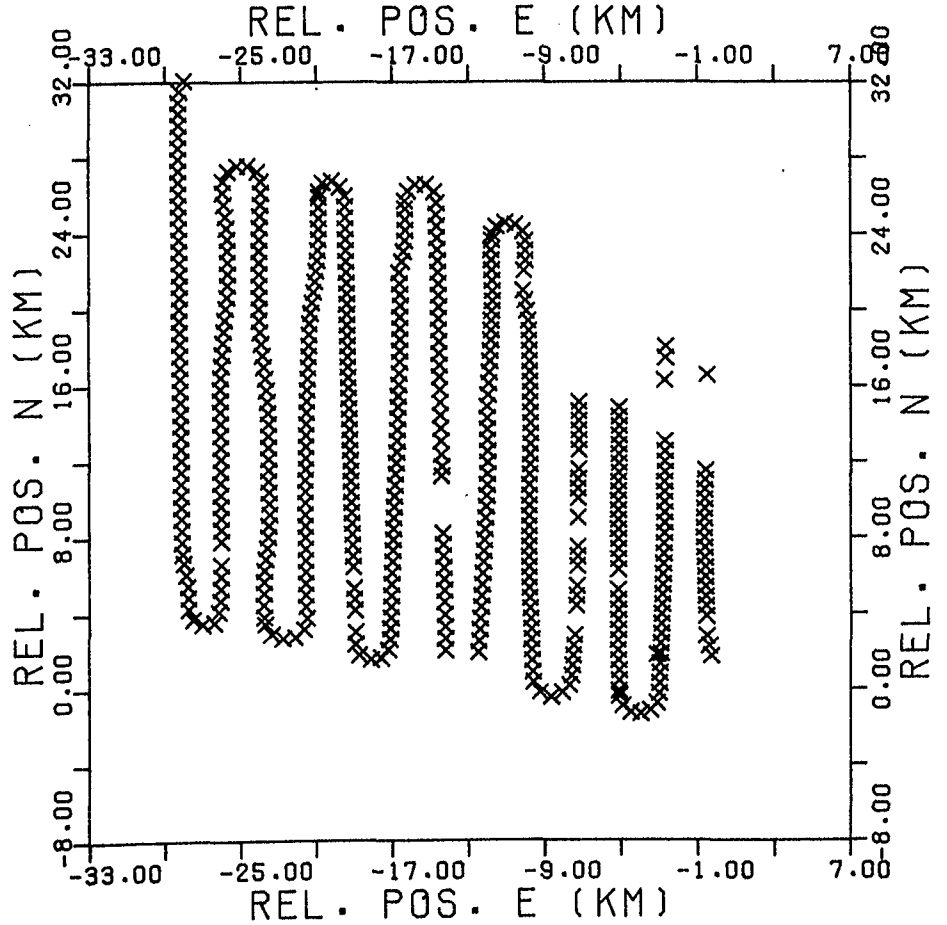


-Potential Temperature on Isobaric Surfaces-

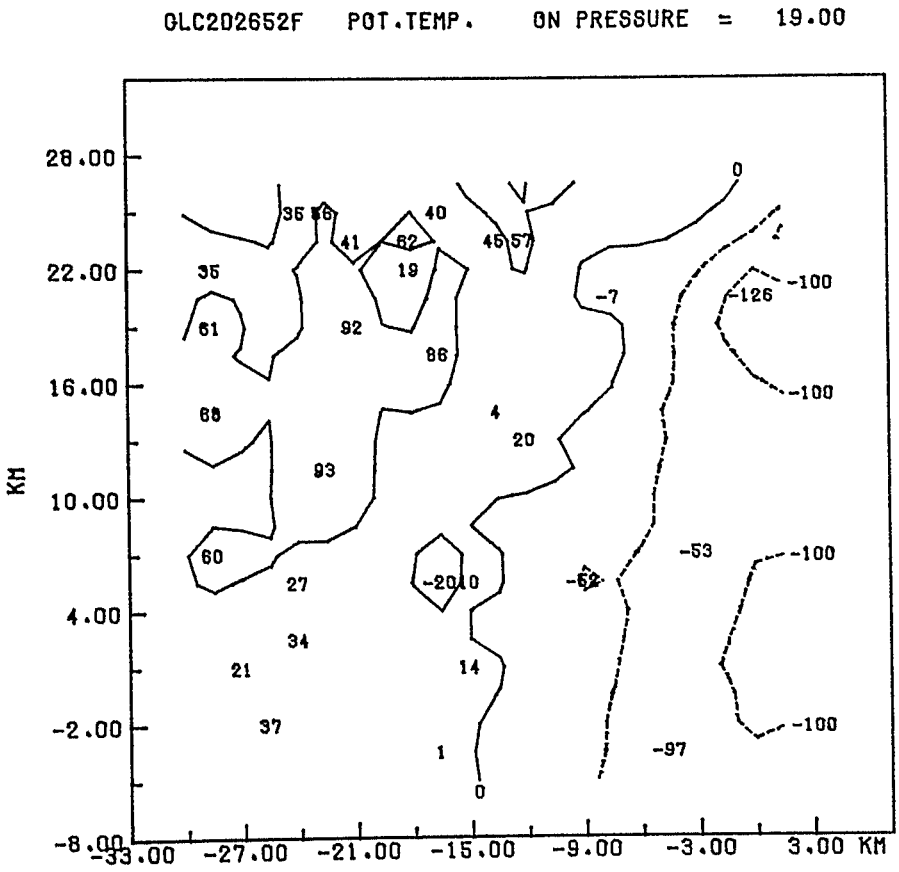

GLC2D2652F POT.TEMP. ON PRESSURE = 17.00
KM
28.00
22.00
16.00
10.00
4.00
-2.00
-8.00
-33.00 -27.00 -21.00 -15.00 -9.00 -3.00 3.00 KM
64 56 64 41 42 58 0
36 26 31 -100
60 -137
102 88 29
68 44 0 19 -100
114
60 27 14 -23 -62 -58 -100
30 44 20 -138
45 -2 0 -101 -100

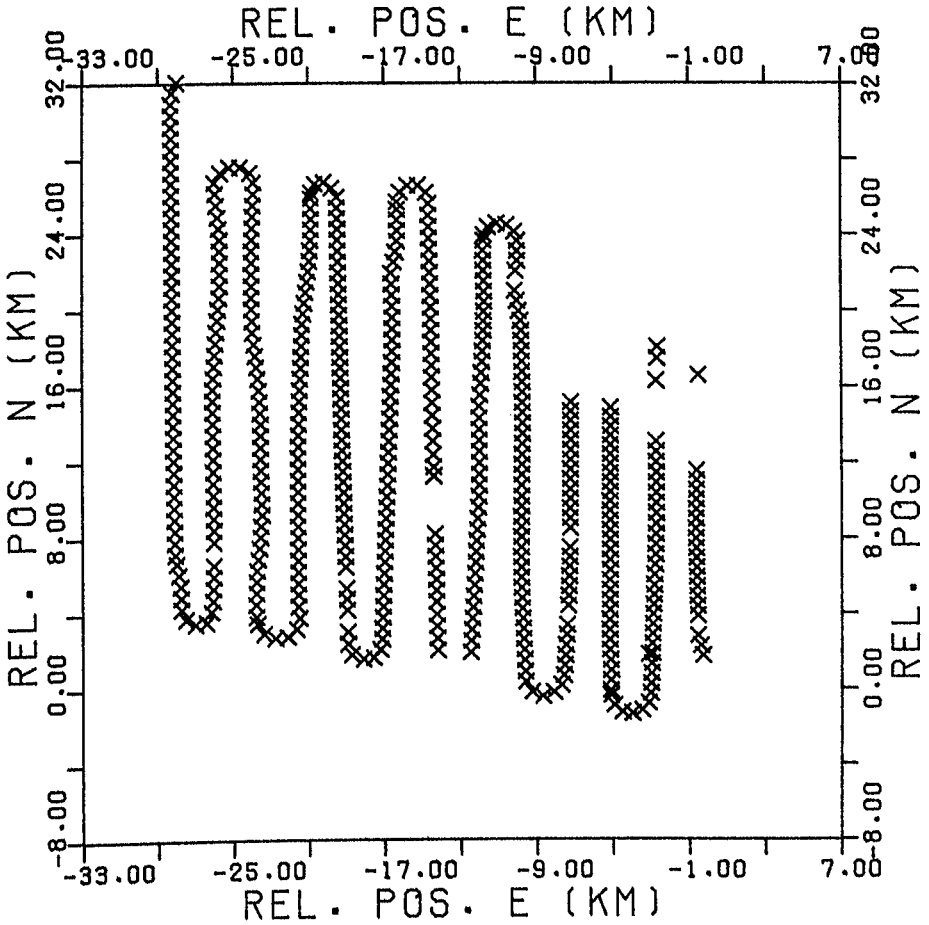

REL. POS. E (KM)
-33.00 -25.00 -17.00 -9.00 -1.00 7.00
REL. POS. N (KM)
32.00
24.00
16.00
8.00
0.00
-8.00



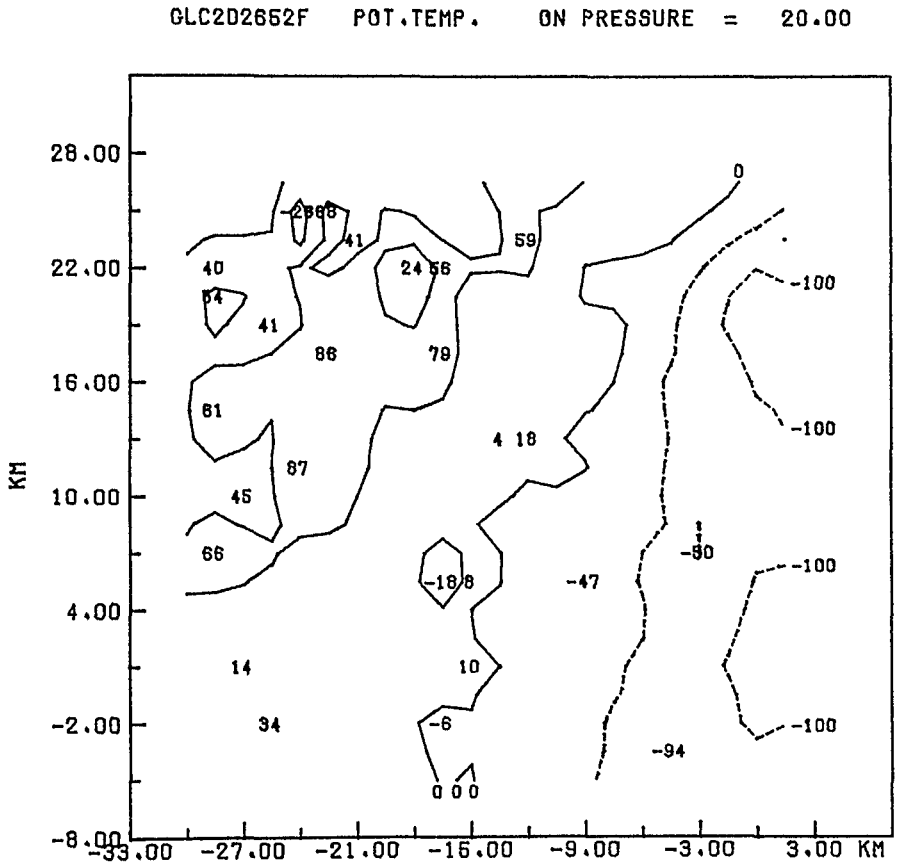


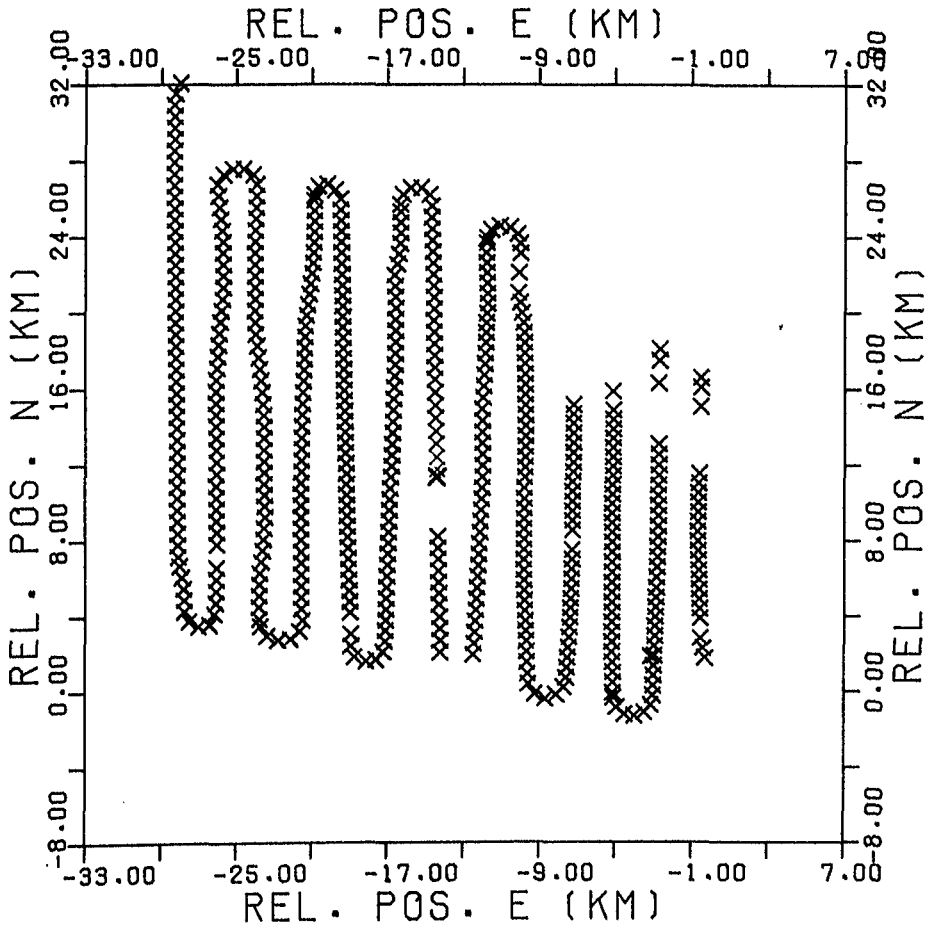
-Potential Temperature on Isobaric Surfaces-



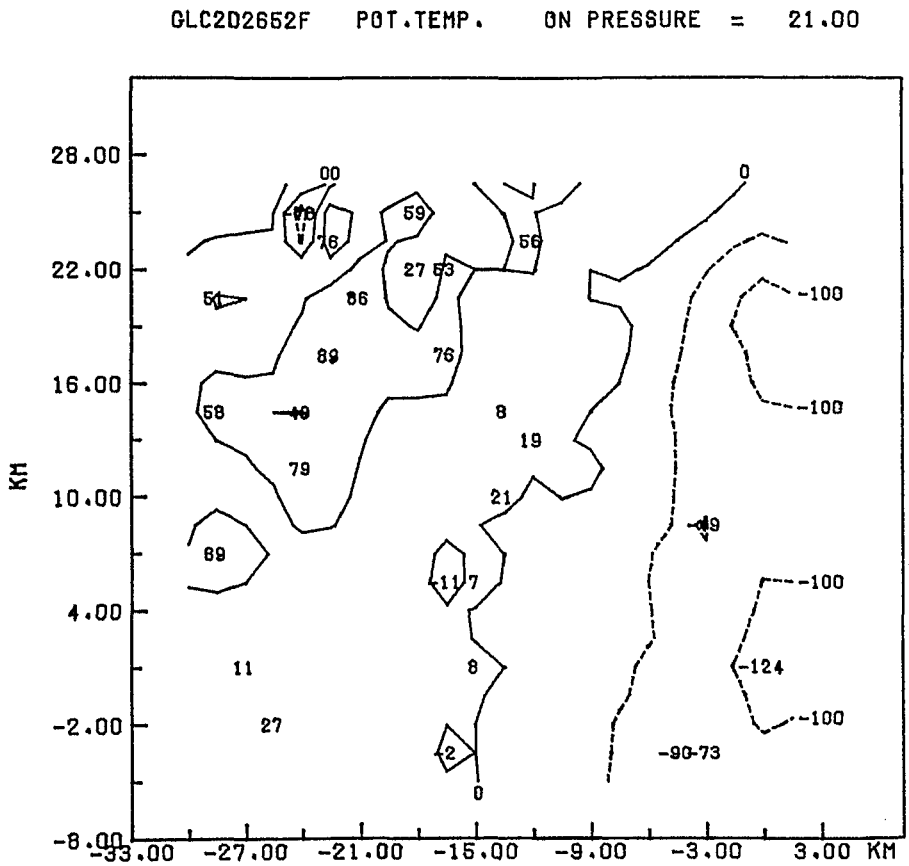


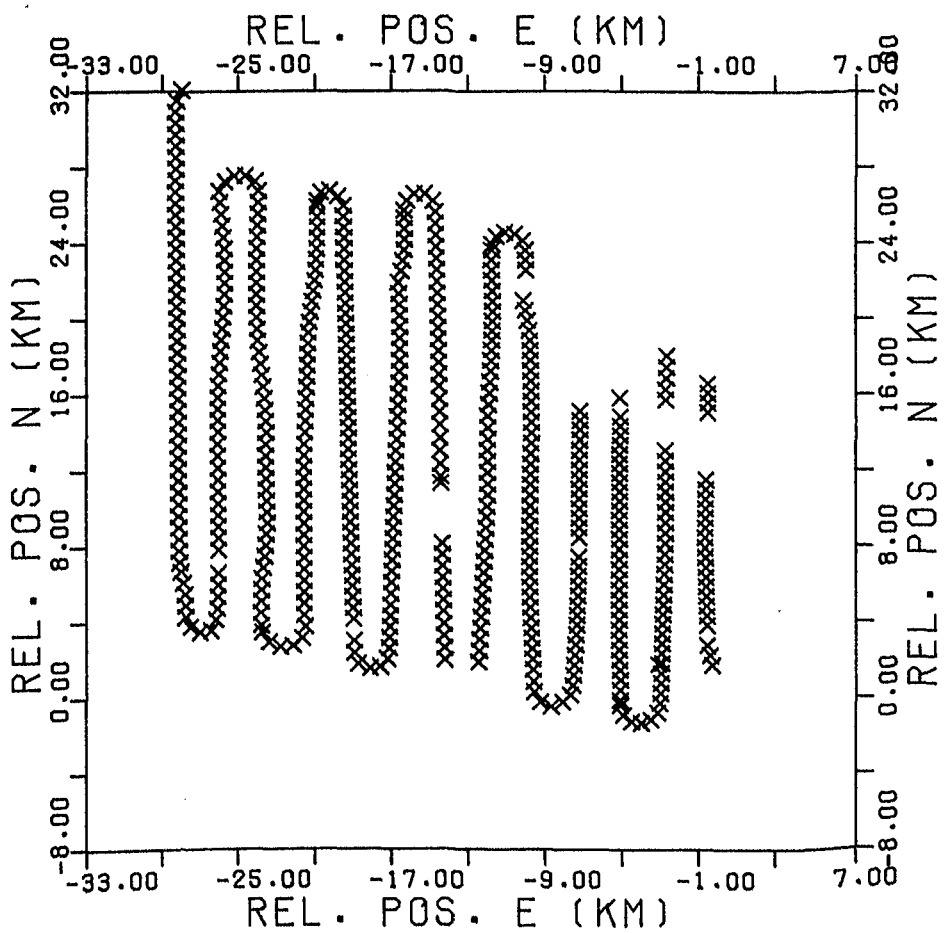
-Potential Temperature on Isobaric Surfaces-



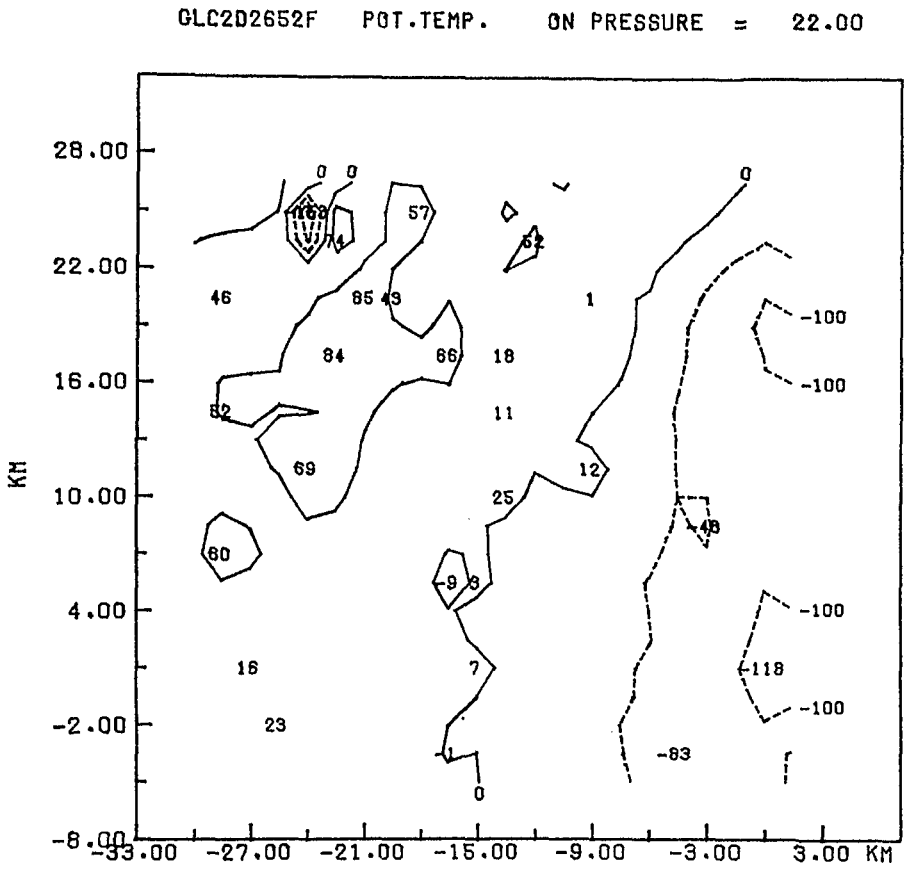


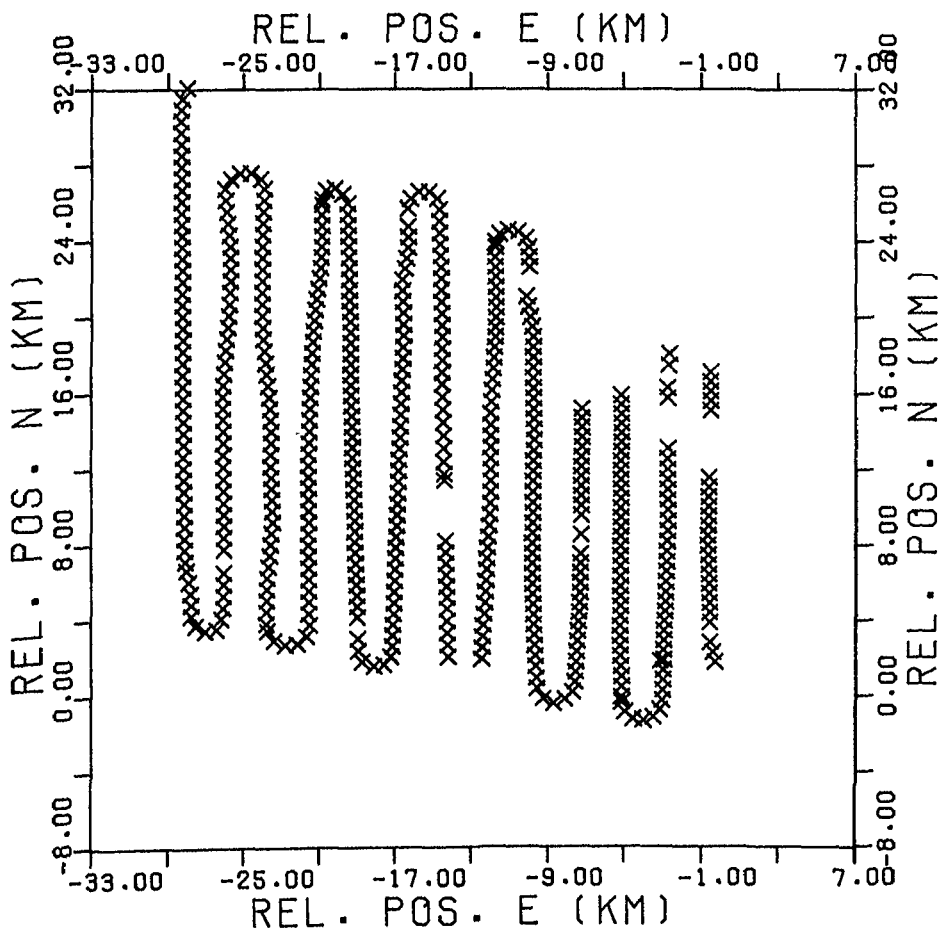
-Potential Temperature on Isobaric Surfaces-

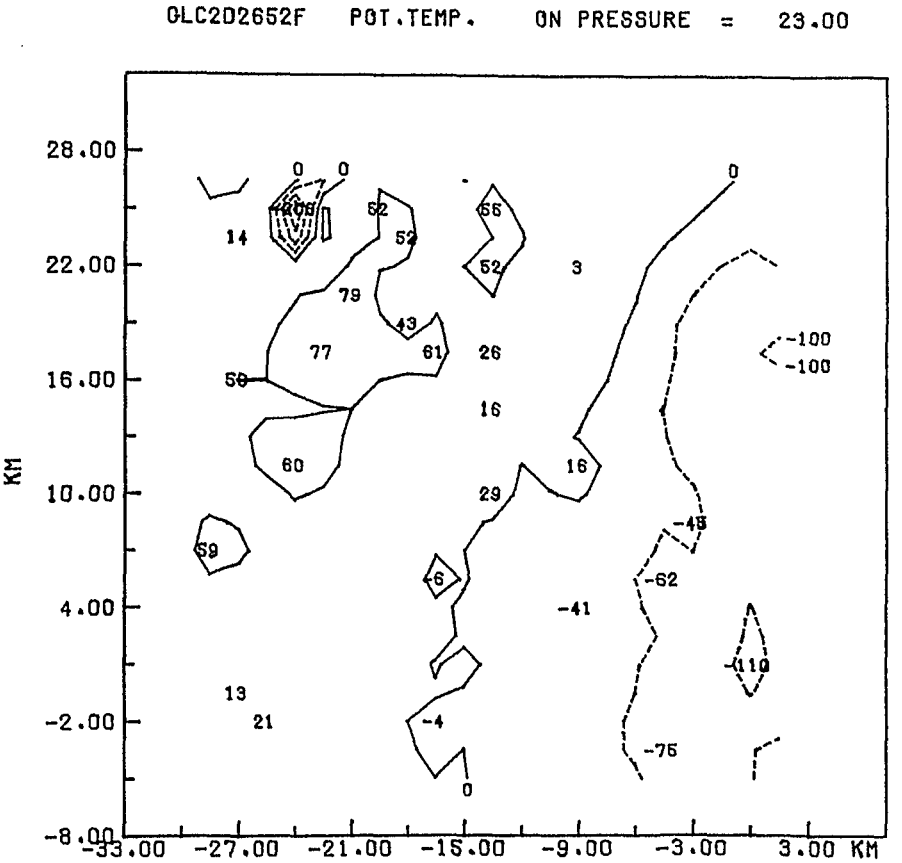


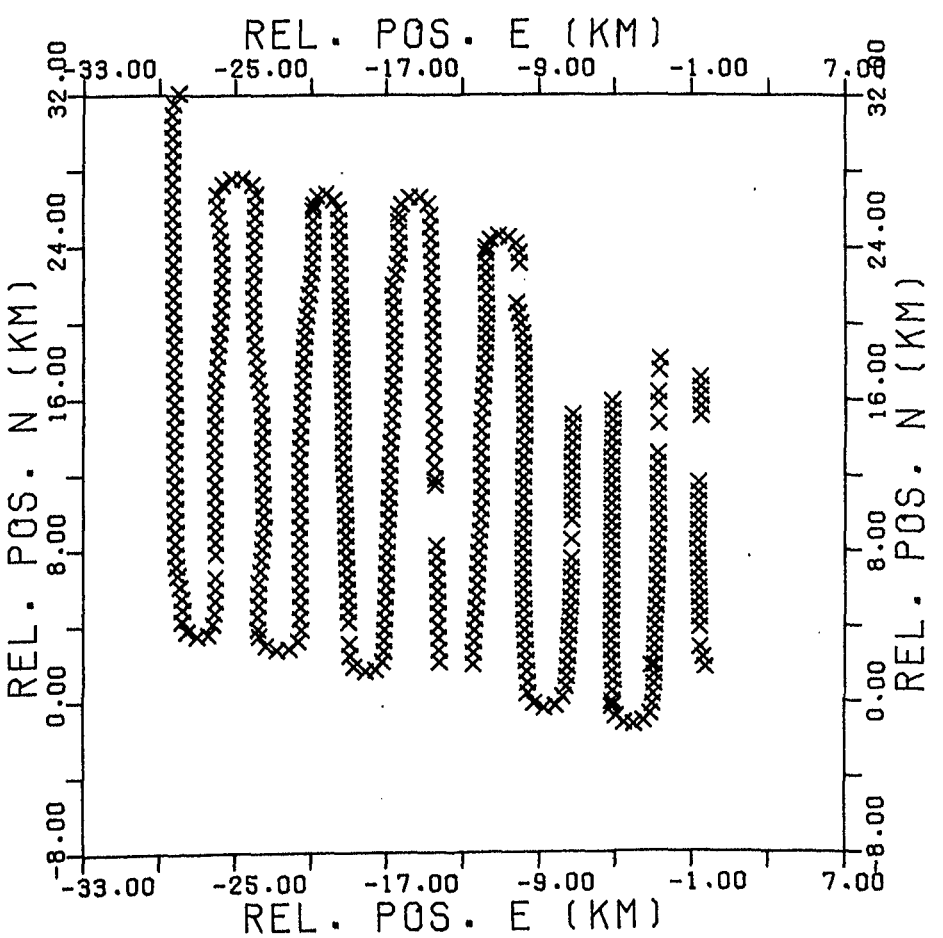


-Potential Temperature on Isobaric Surfaces-

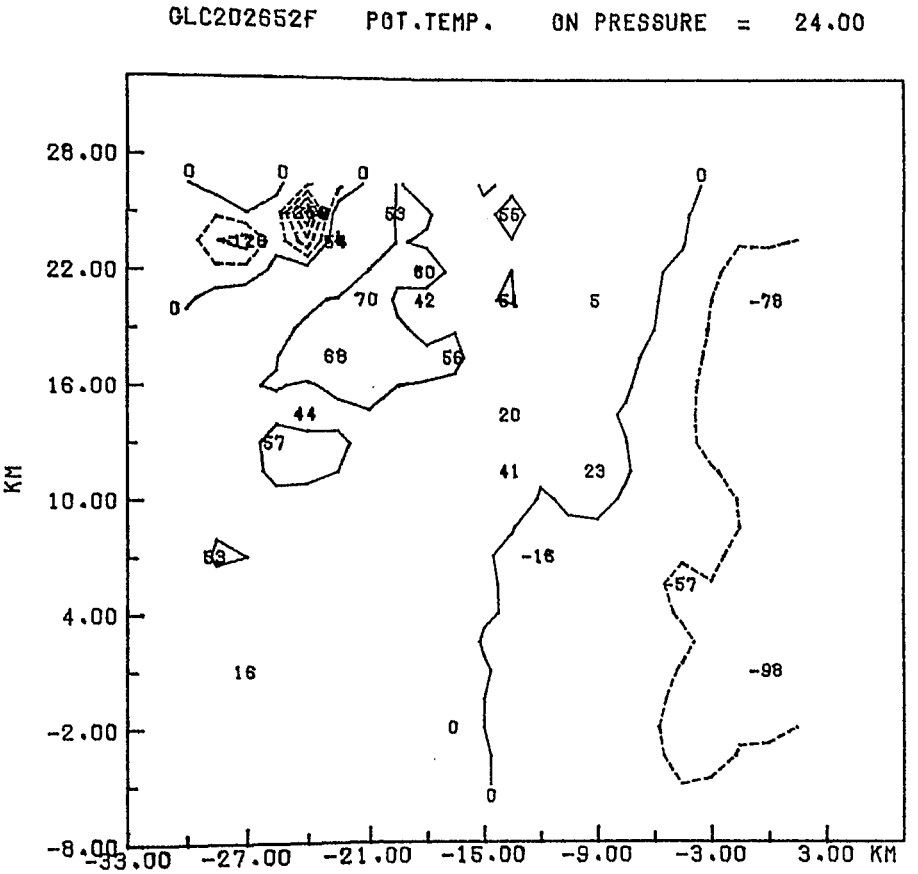

GLC2D2652F POT.TEMP. ON PRESSURE = 22.00
KM
28.00
22.00
16.00
10.00
4.00
-2.00
-8.00
-33.00 -27.00 -21.00 -15.00 -9.00 -3.00 3.00 KM
0 0
57
62
0
46
85 43
1
-100
84
66
18
-100
82
11
69
12
25
48
60
-9 8
-100
16
7
-118
23
-100
-83
0

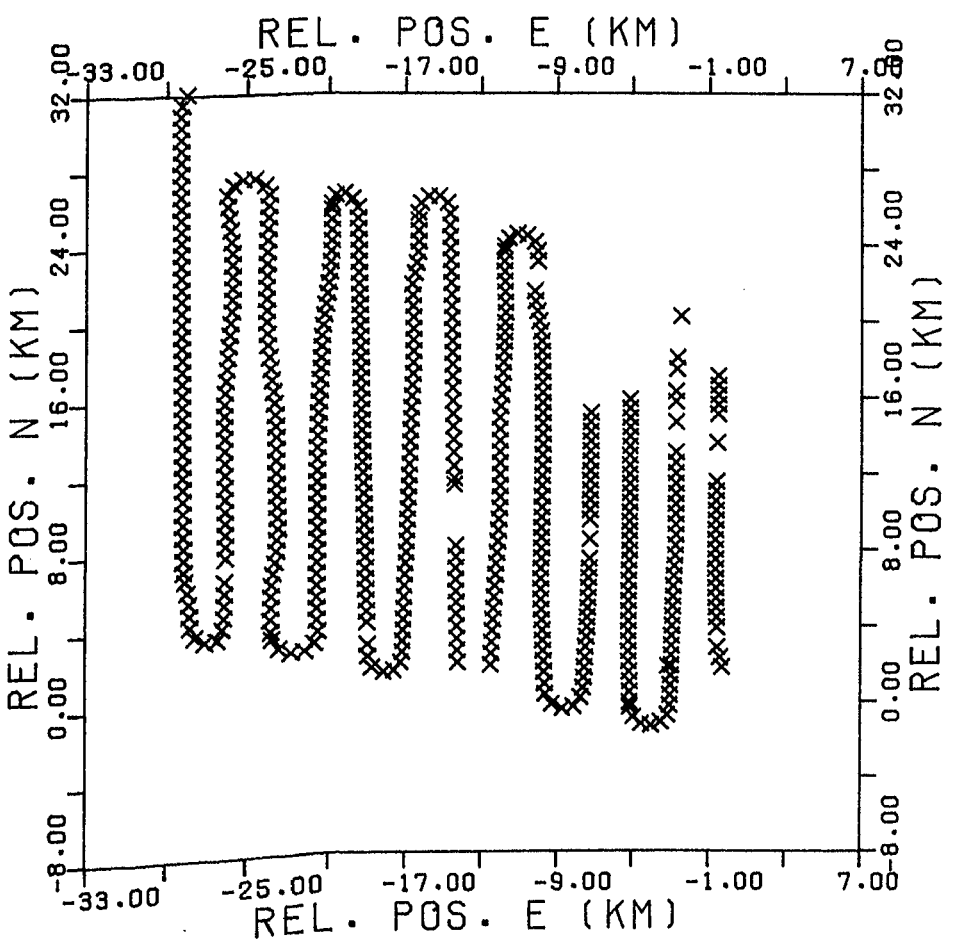

REL. POS. E (KM)
-33.00 -25.00 -17.00 -9.00 -1.00 7.00
REL. POS. N (KM)
32.00
24.00
16.00
8.00
0.00
-8.00



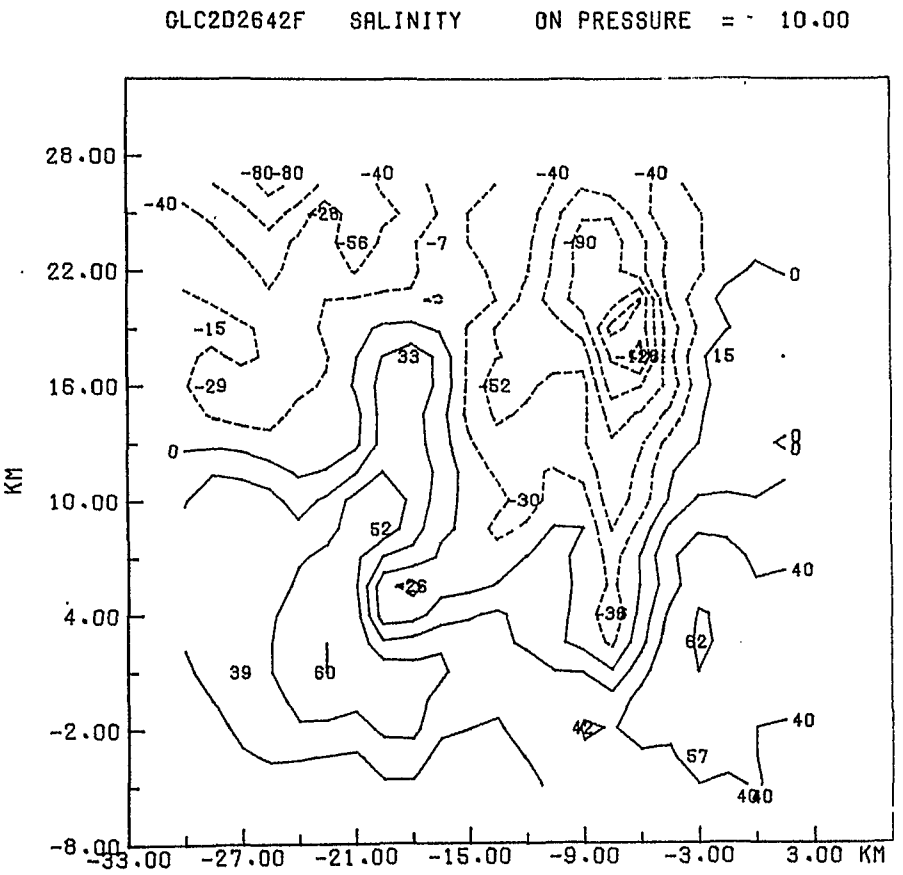


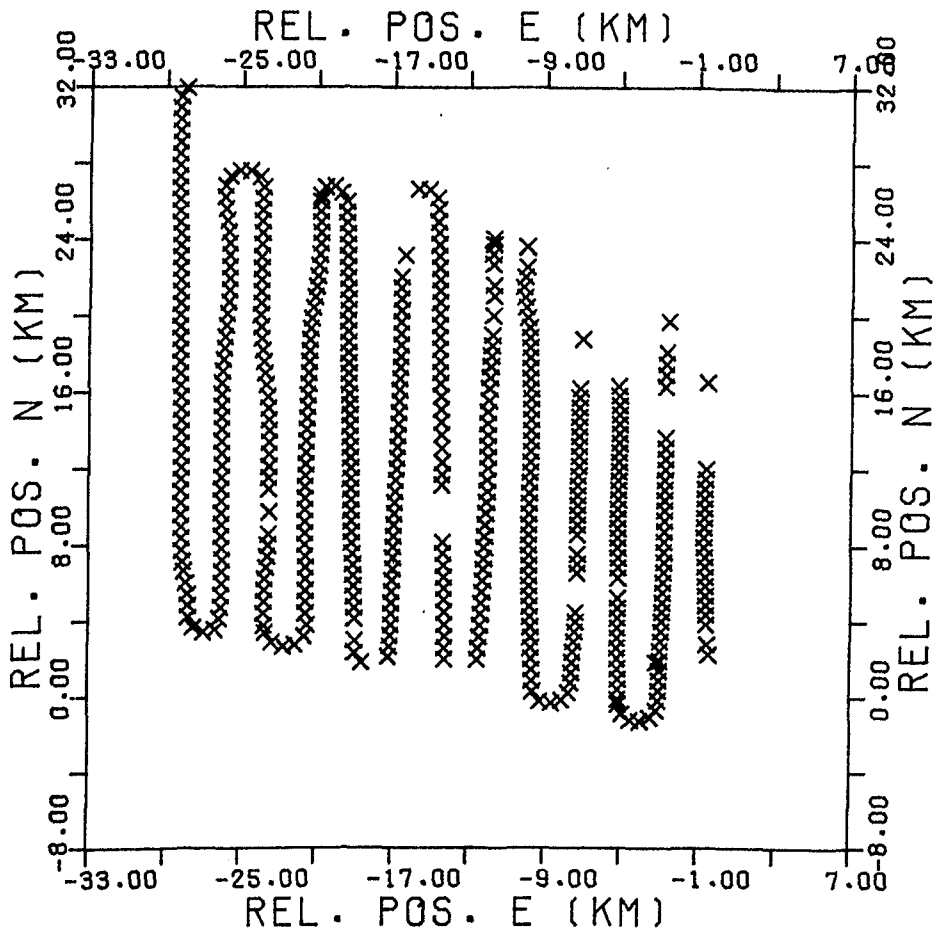
-Potential Temperature on Isobaric Surfaces-


GLC202652F POT.TEMP. ON PRESSURE = 24.00
KM
28.00
22.00
16.00
10.00
4.00
-2.00
-8.00
-33.00
-27.00
-21.00
-15.00
-9.00
-3.00
3.00 KM

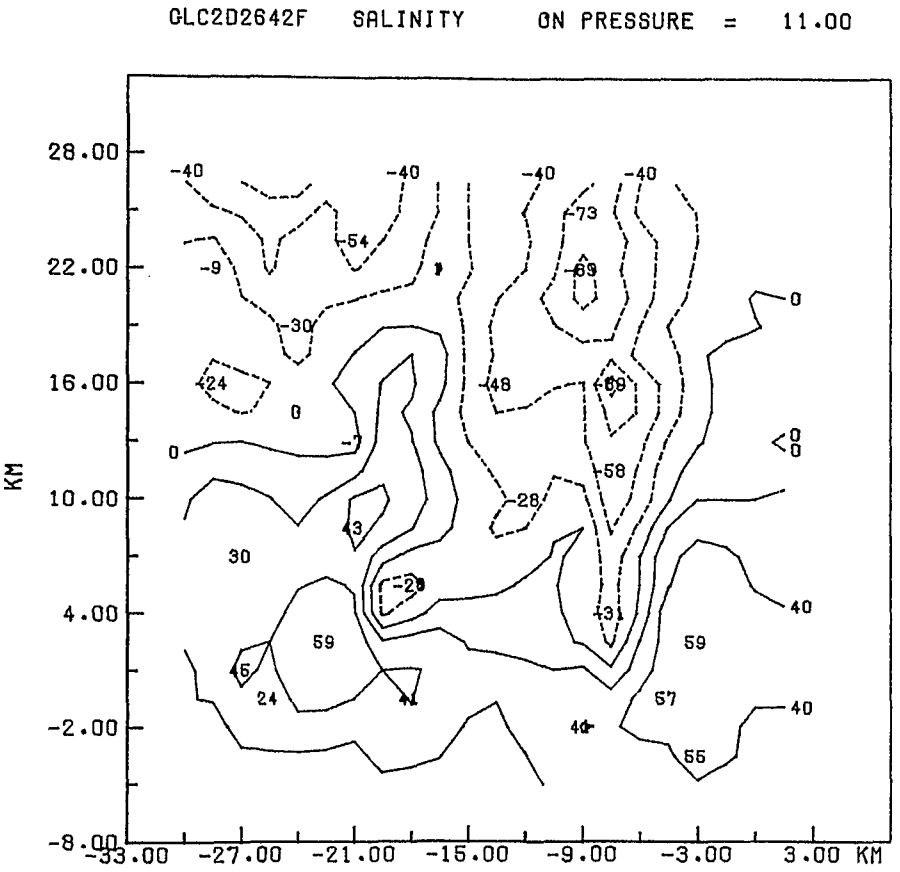

REL. POS. E (KM)
REL. POS. N (KM)
-33.00
-25.00
-17.00
-9.00
-1.00
7.00
32.00
24.00
16.00
8.00
0.00
-8.00

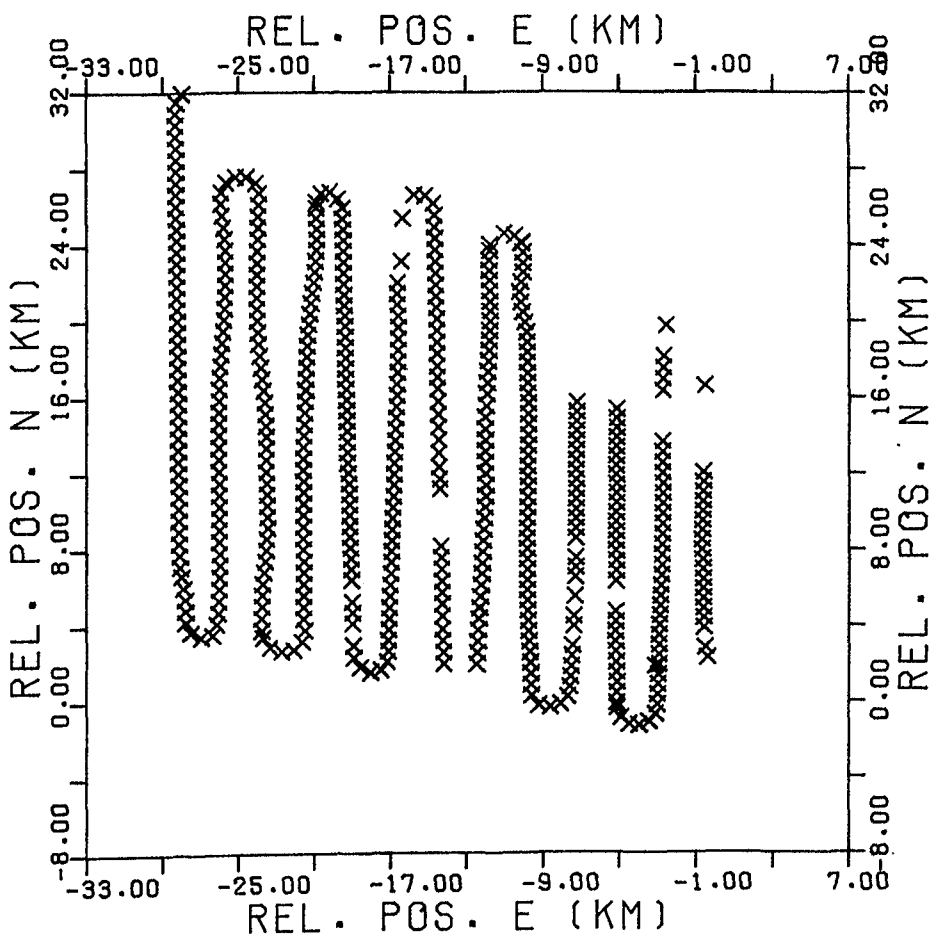
2. Contoured maps of salinity on surfaces of constant pressure in the range 10 to 24 dbar. The contours are of the salinity deviation (units in ppm) from the mean salinity on the surface, whose value is given in the table at the beginning of this Section. The contour interval is 20 ppm, the surface interval is 1.0 dbar and the grid spacing in the objective analysis was 1.5 km. The scale of the maps is 1 : 400 000.



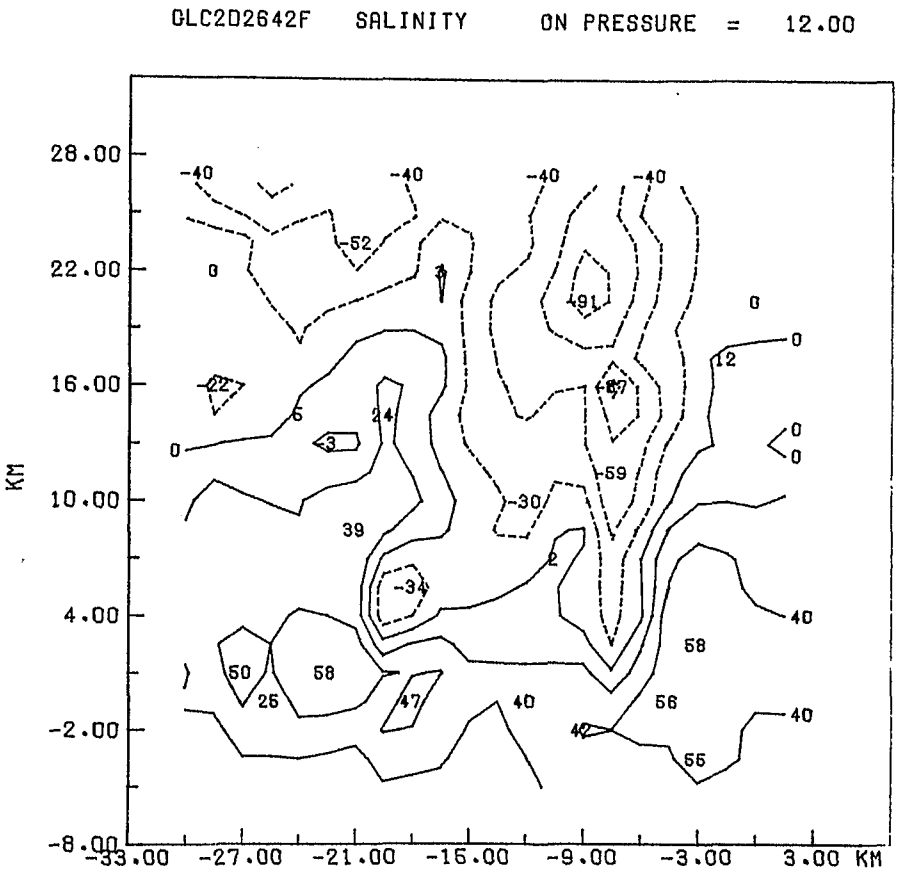


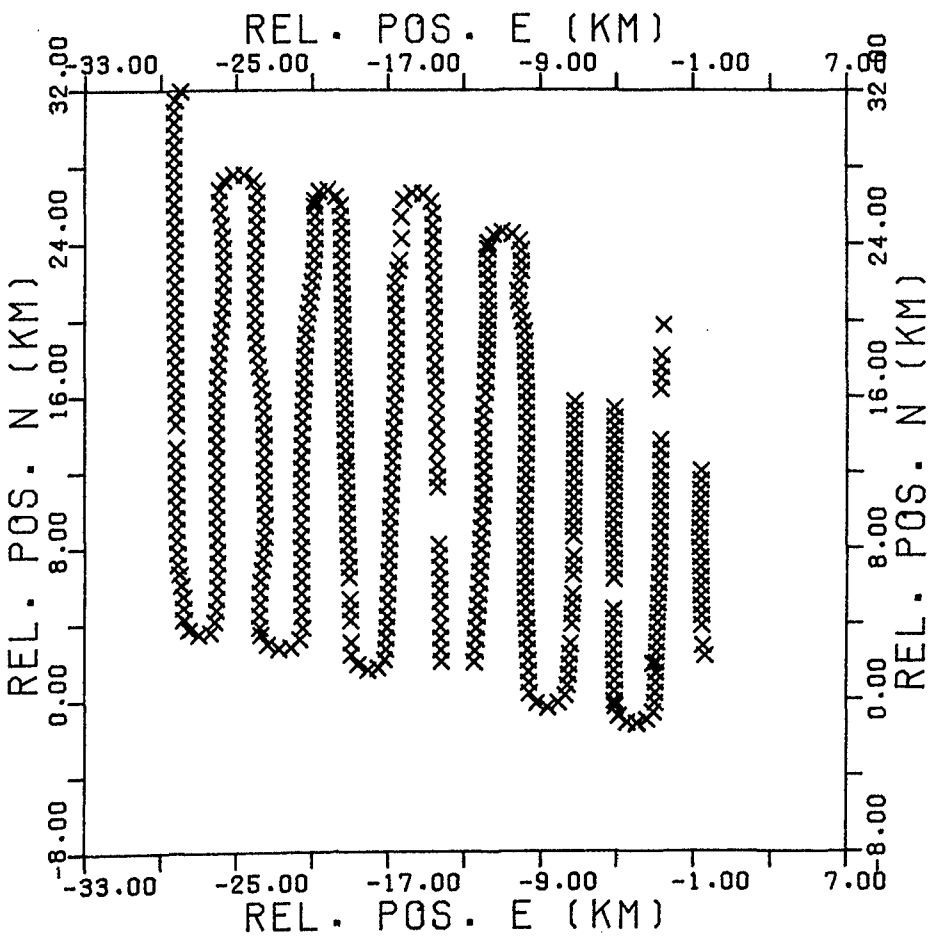
-Salinity on Isobaric Surfaces-



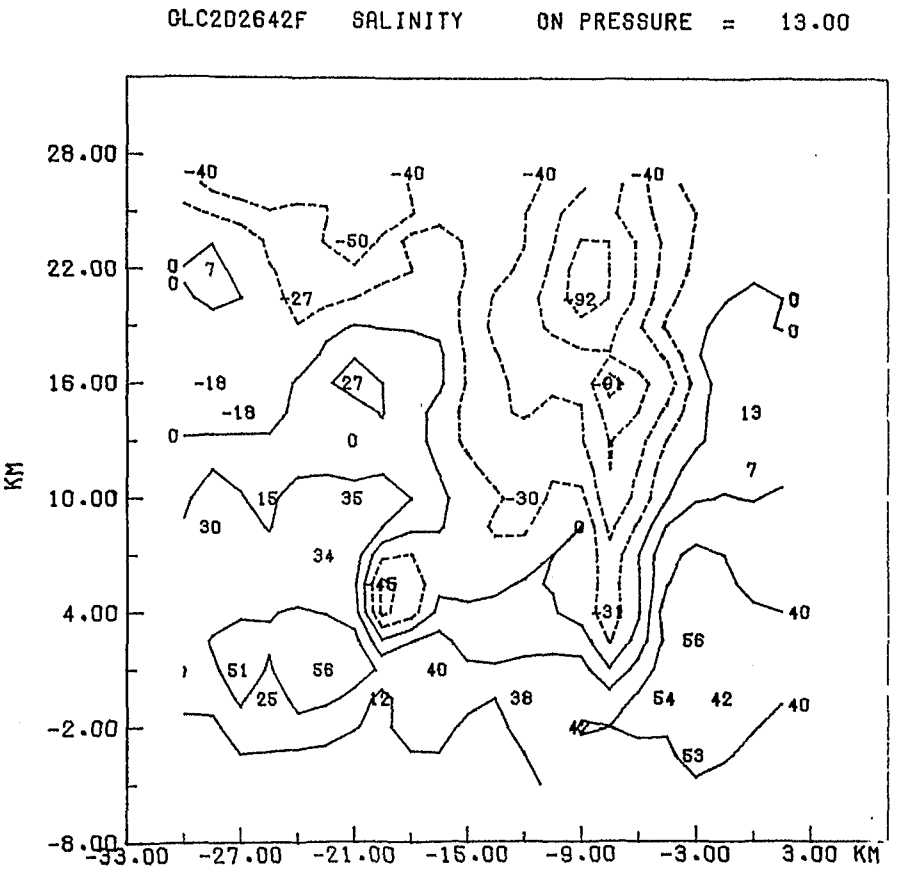


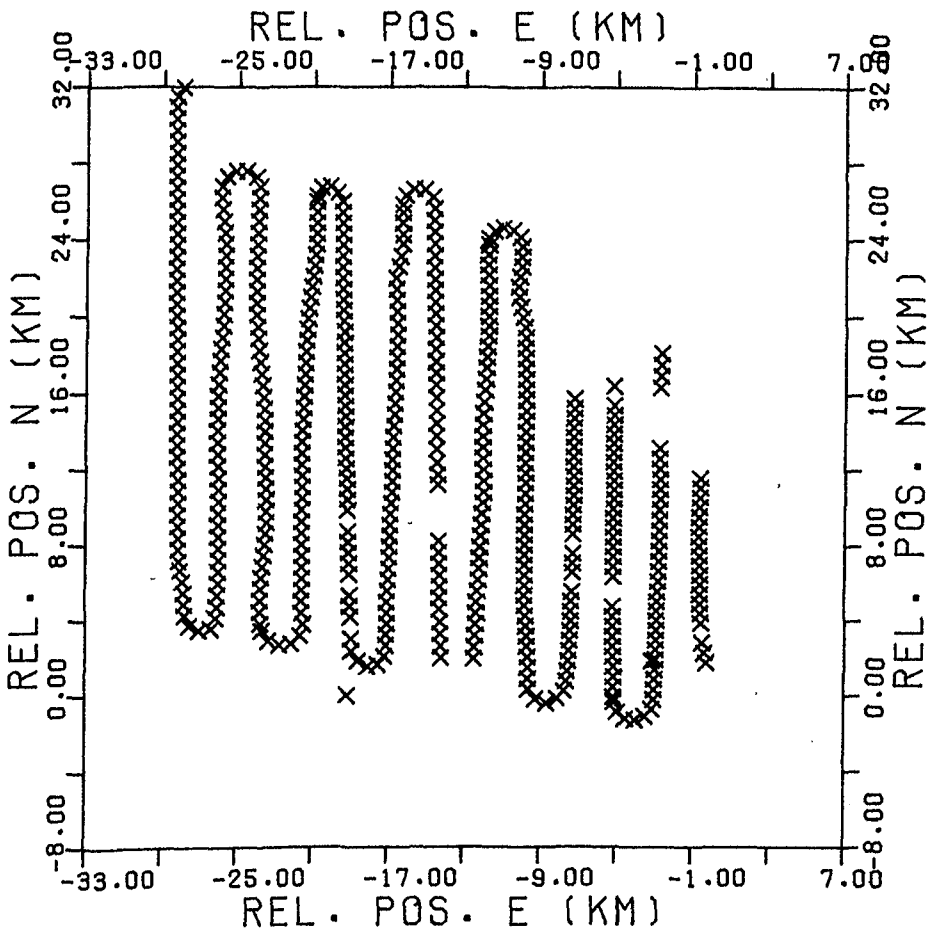
-Salinity on Isobaric Surfaces-



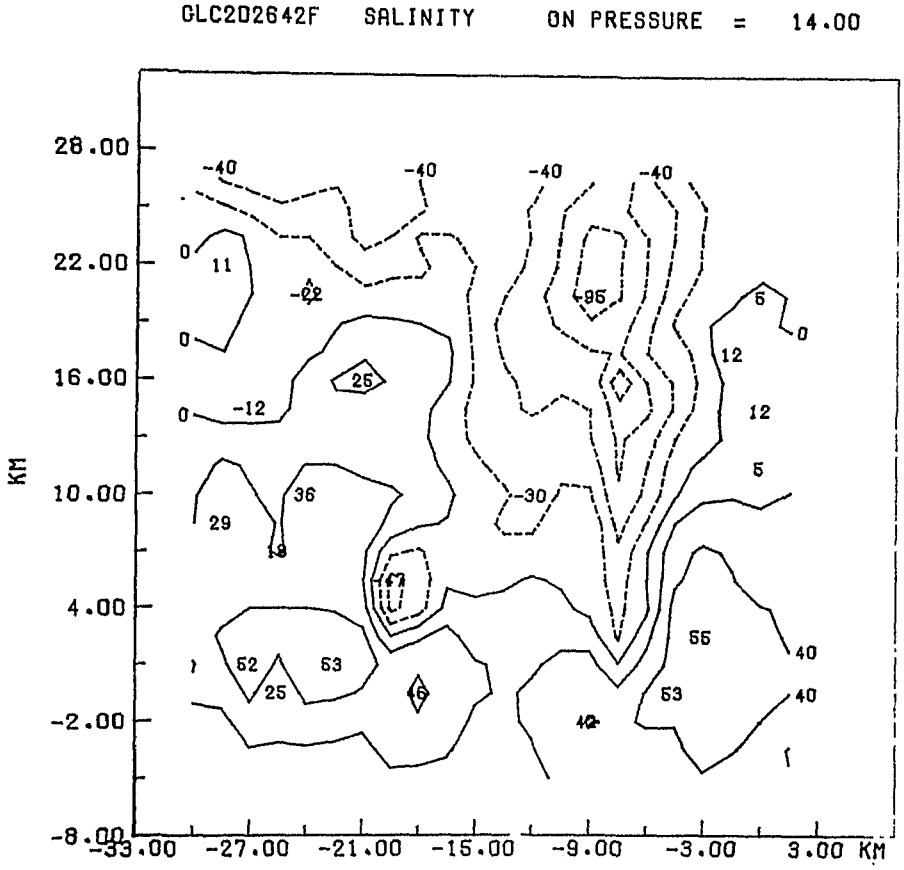


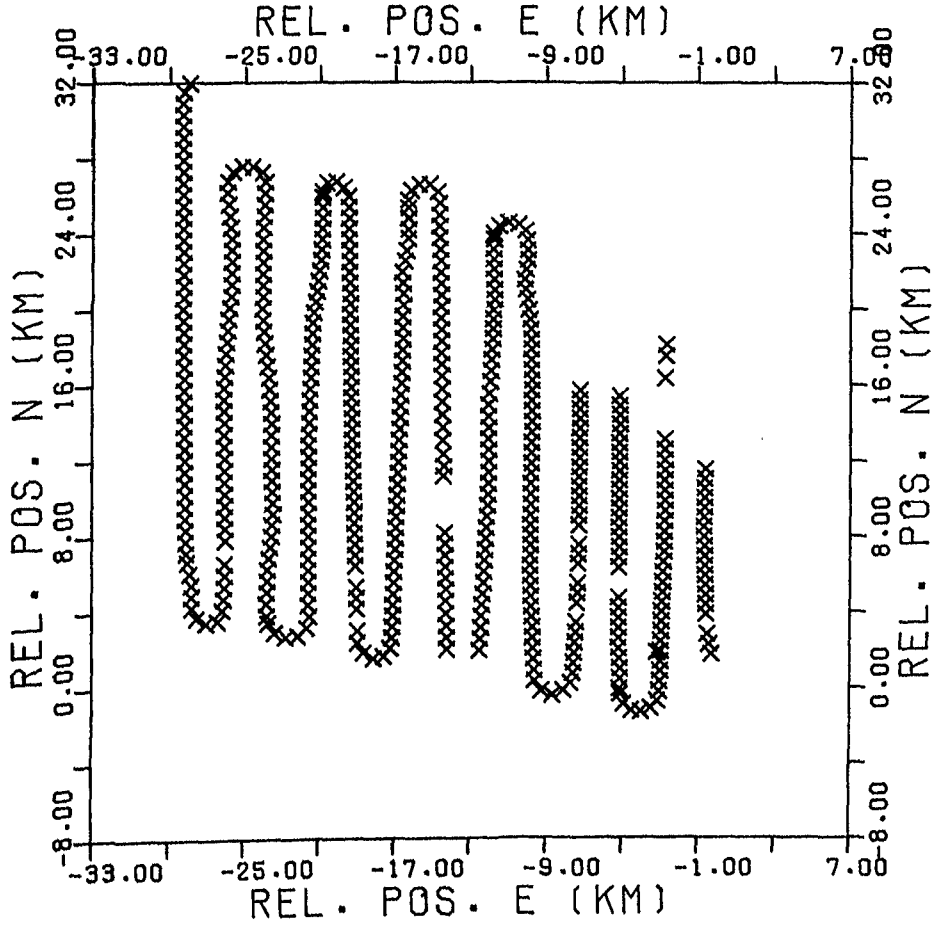
-Salinity on Isobaric Surfaces-



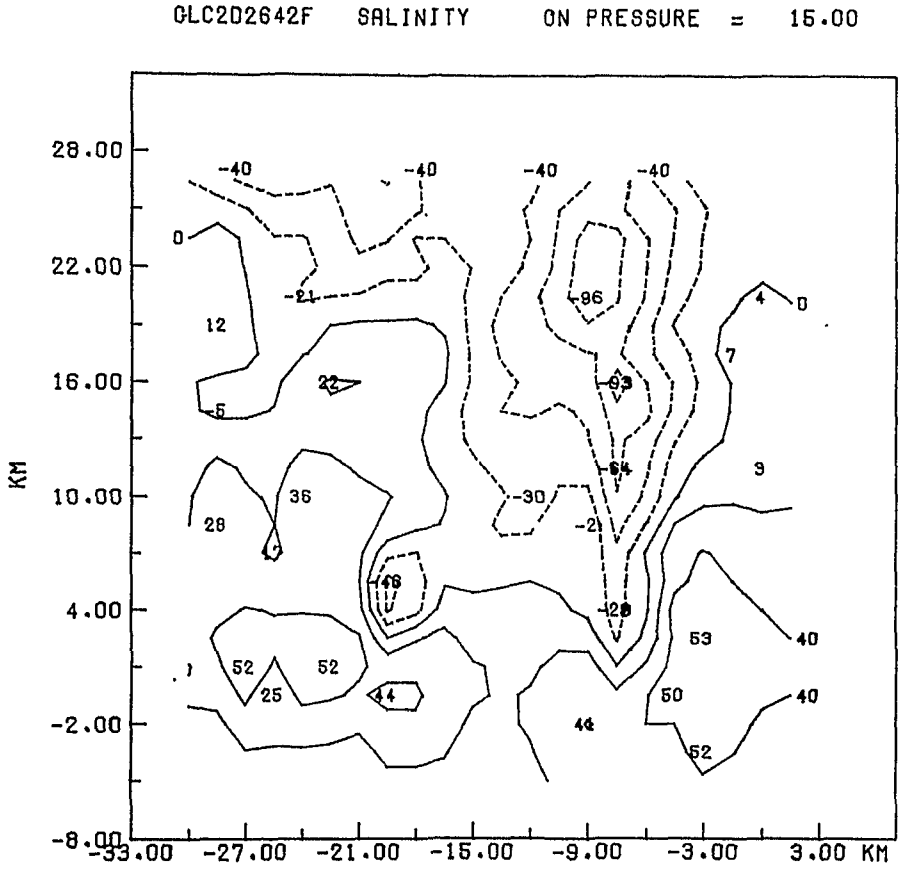


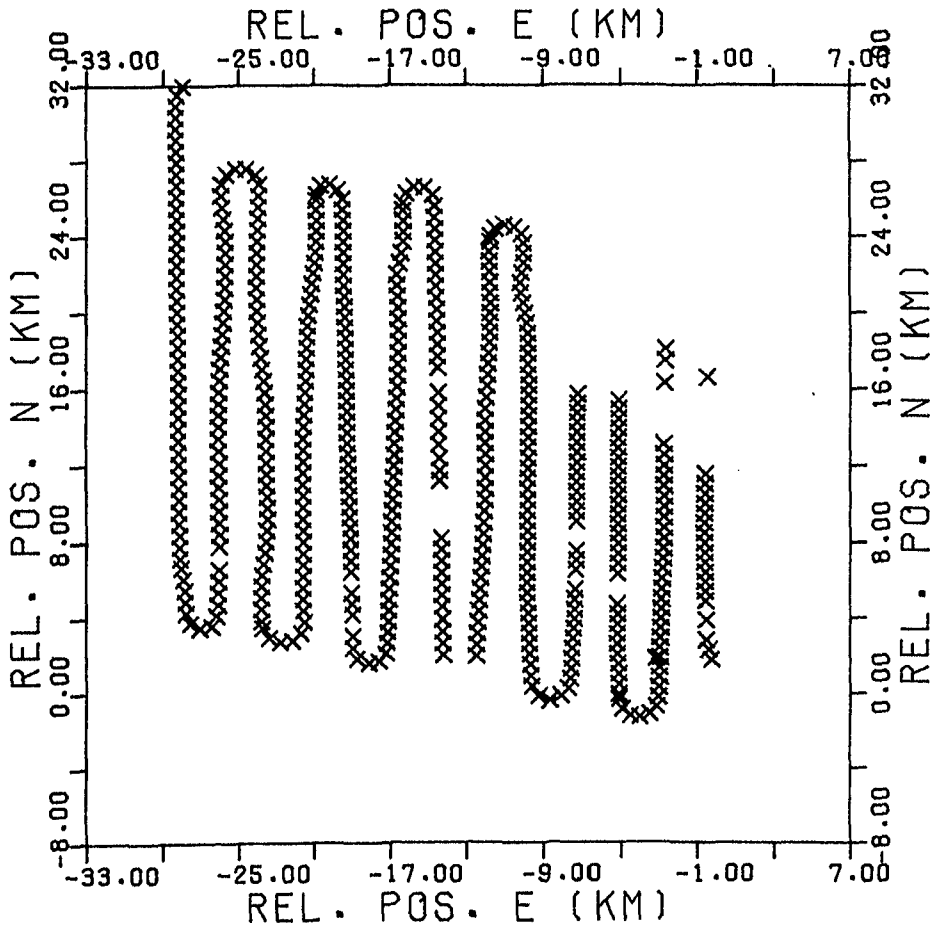
-Salinity on Isobaric Surfaces-



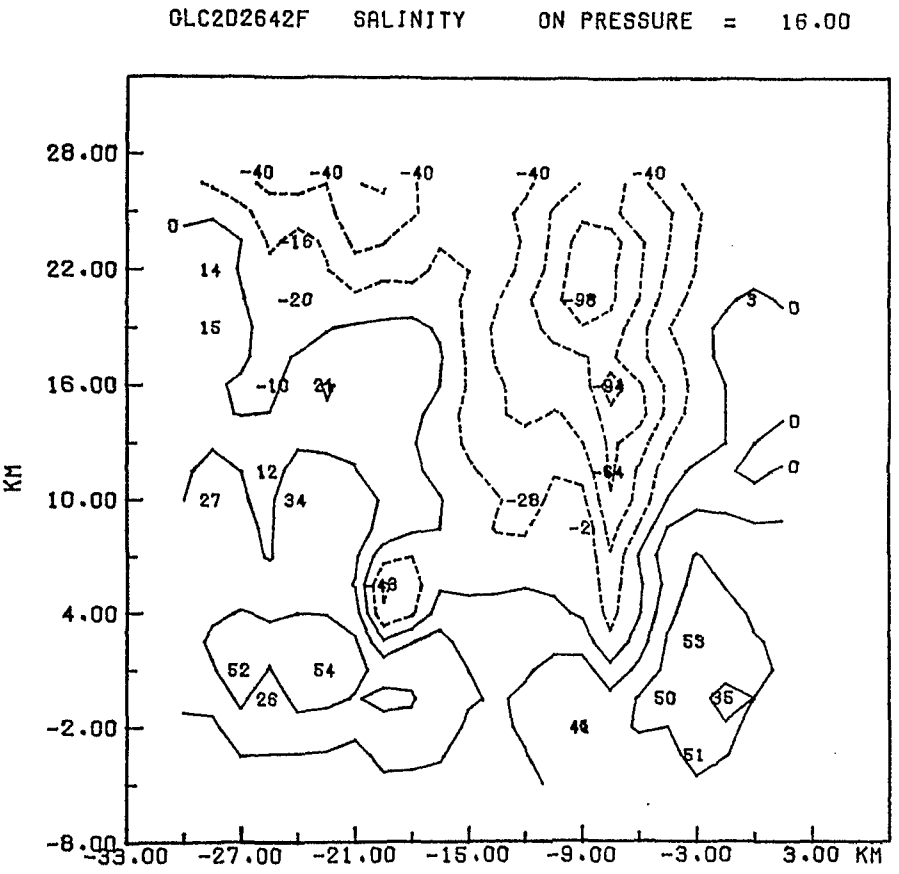


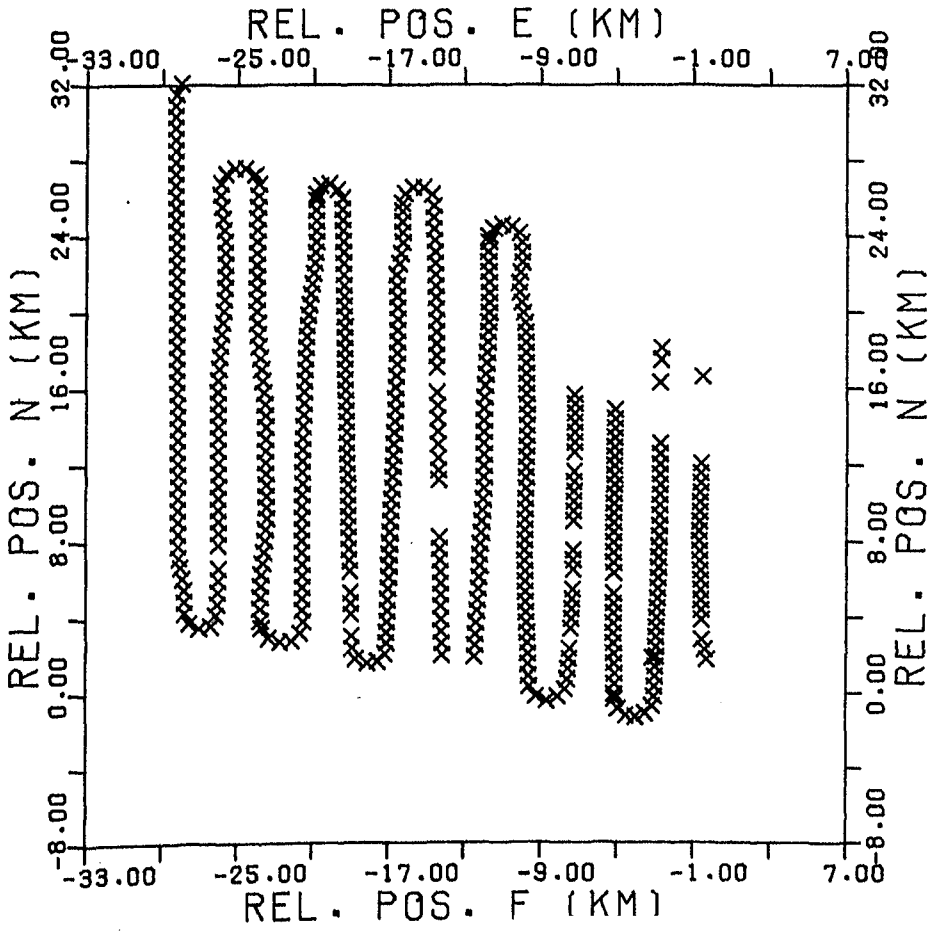
-Salinity on Isobaric Surfaces-



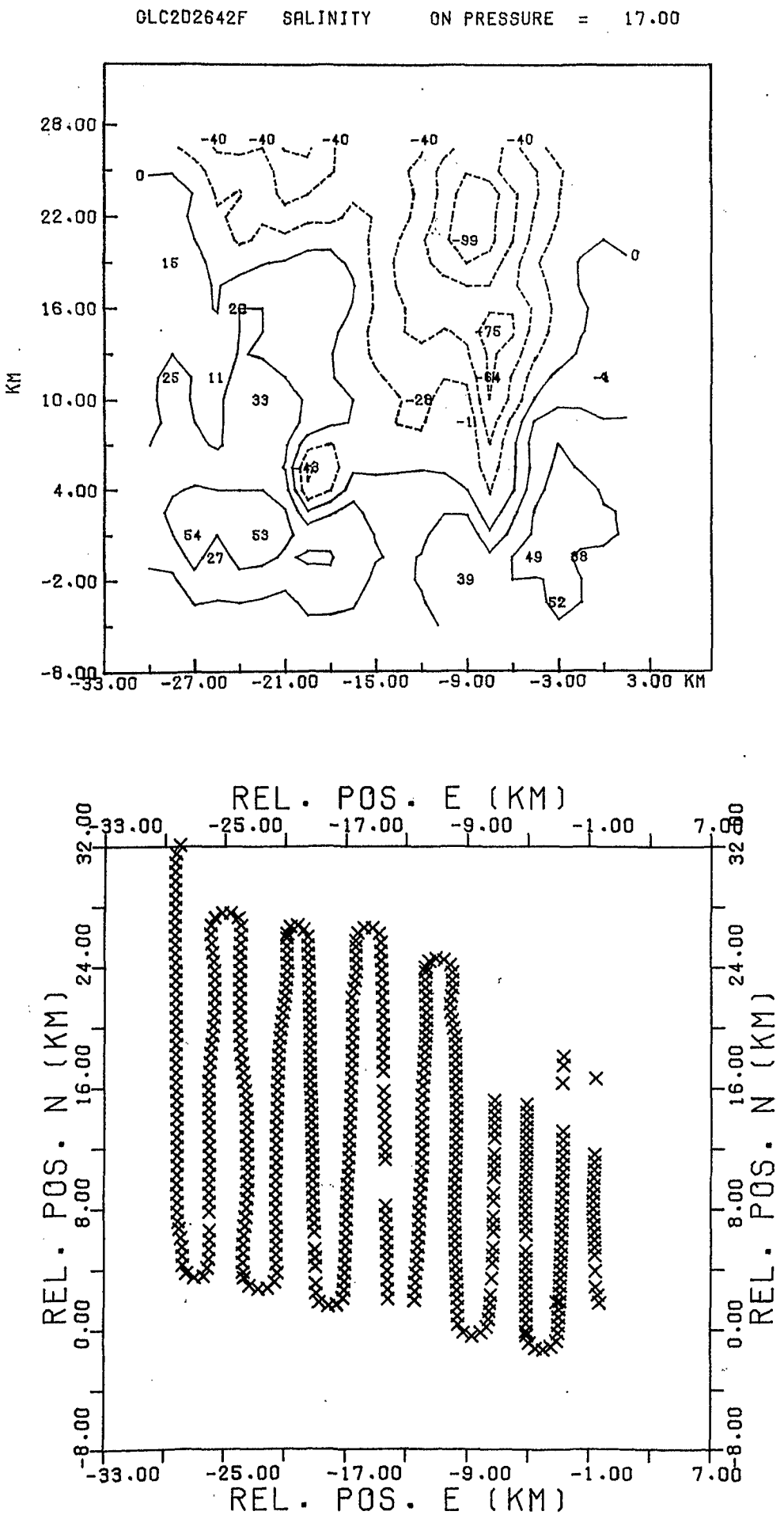


-Salinity on Isobaric Surfaces-

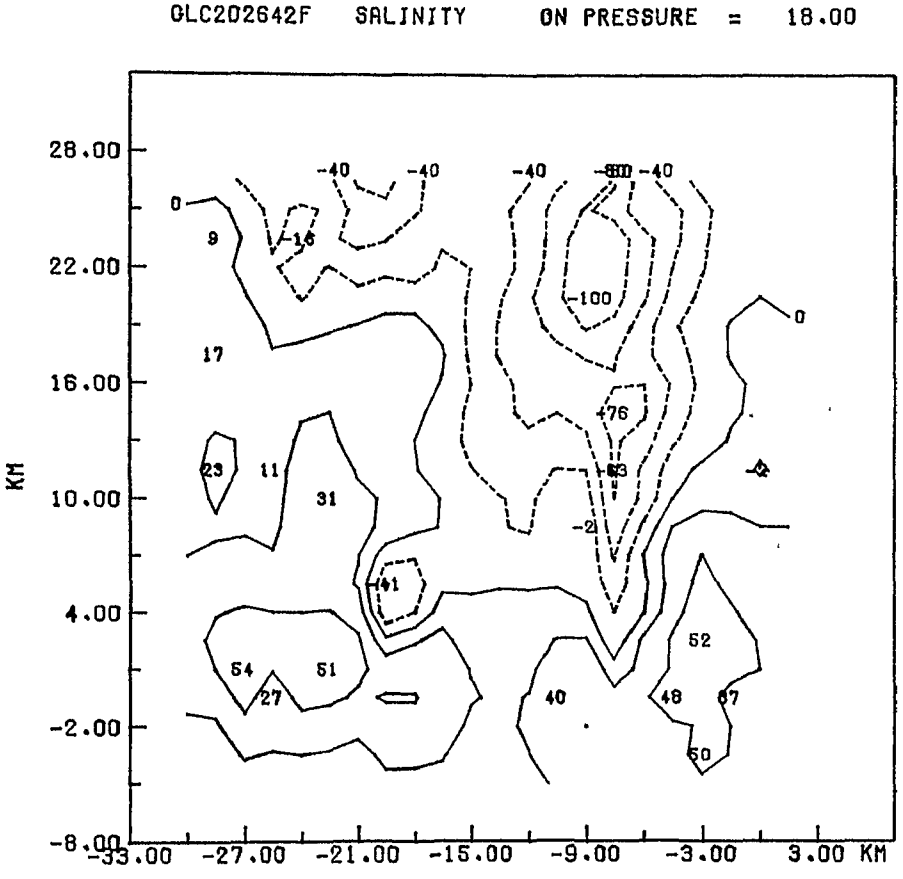


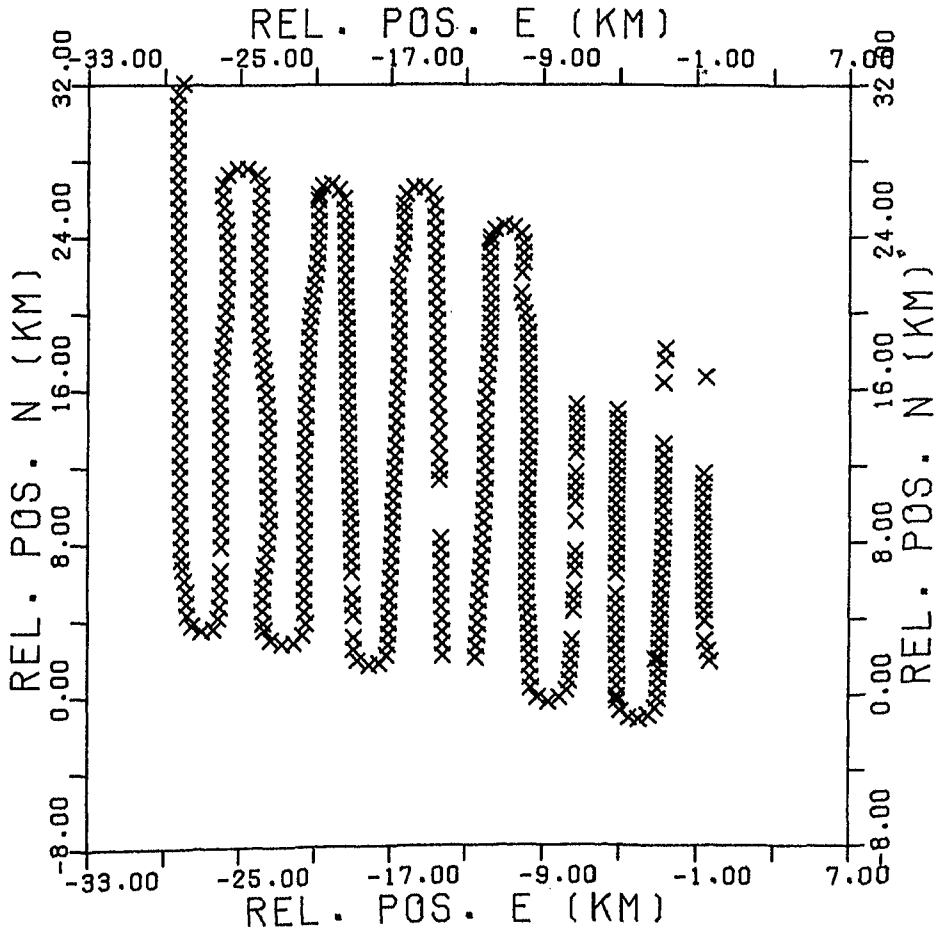


-Salinity on Isobaric Surfaces-

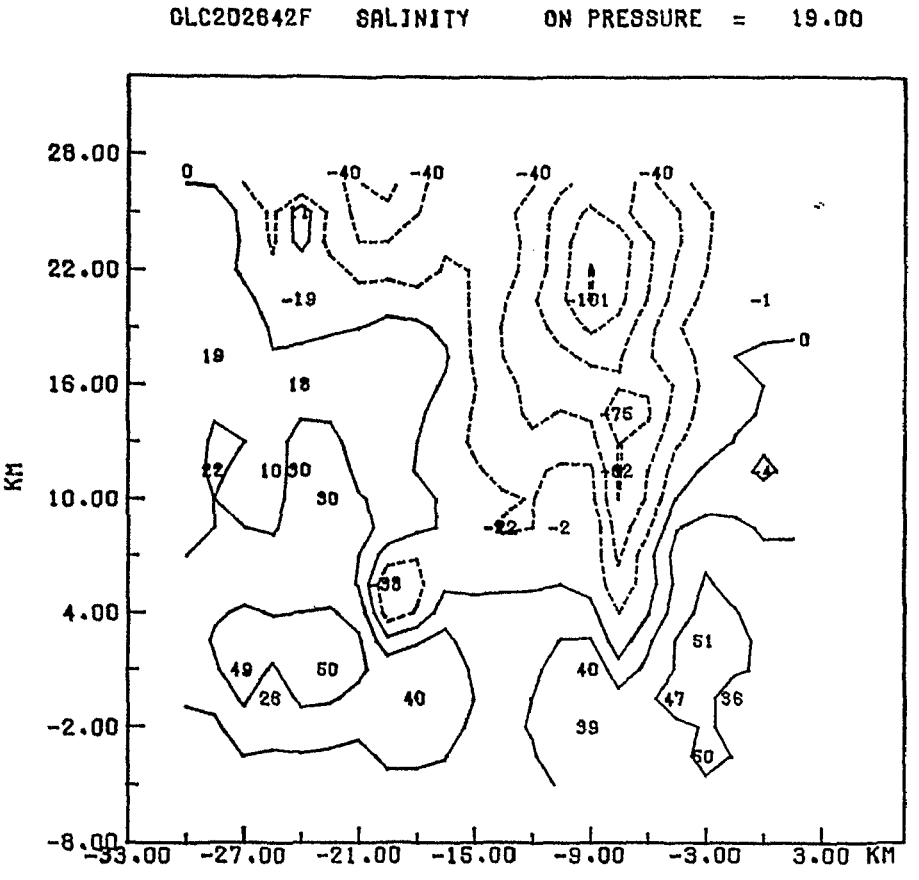


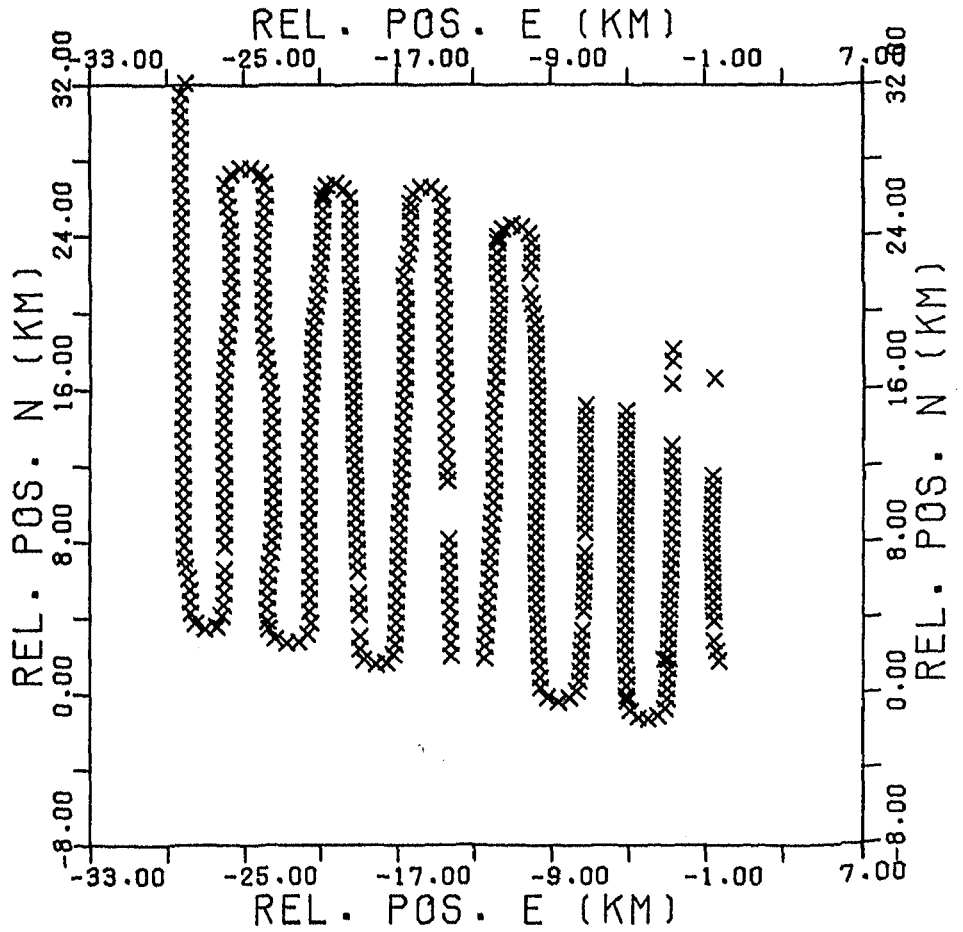
-Salinity on Isobaric Surfaces-



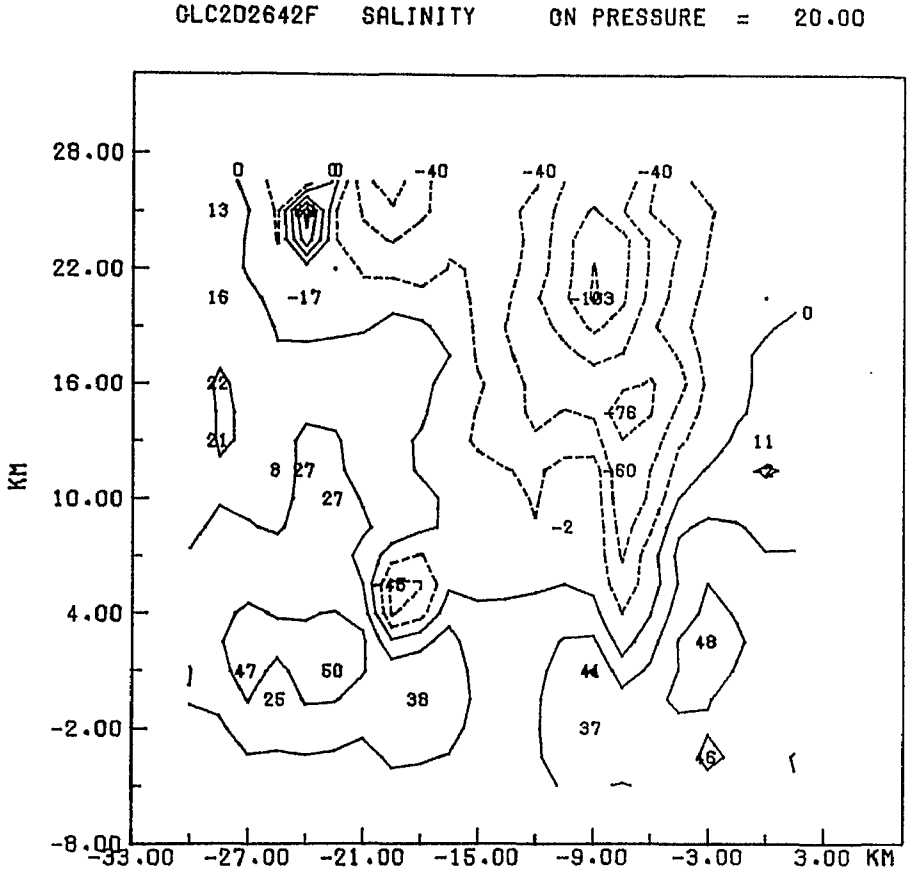


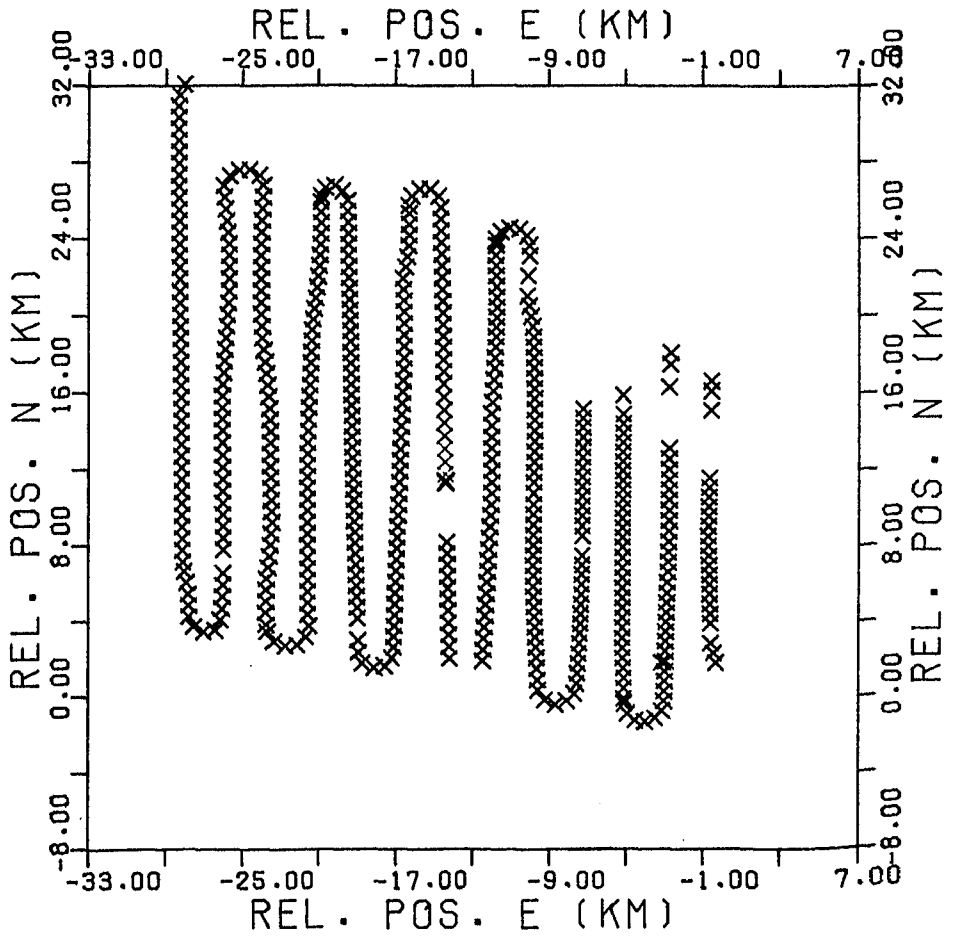
-Salinity on Isobaric Surfaces-



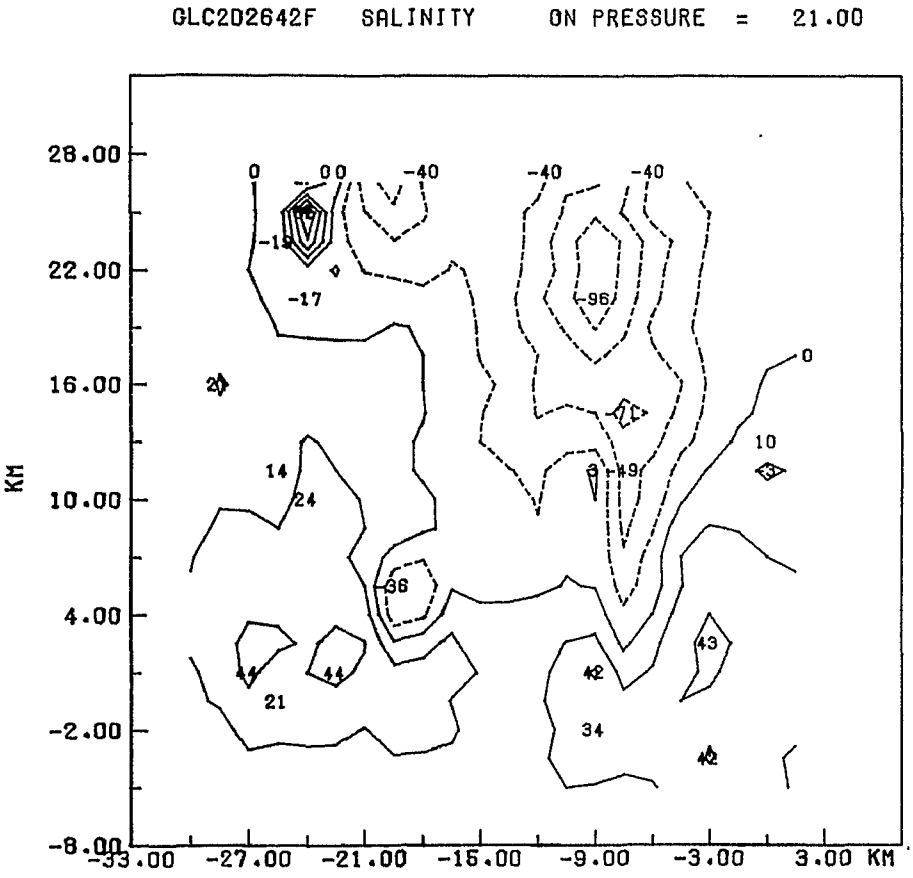


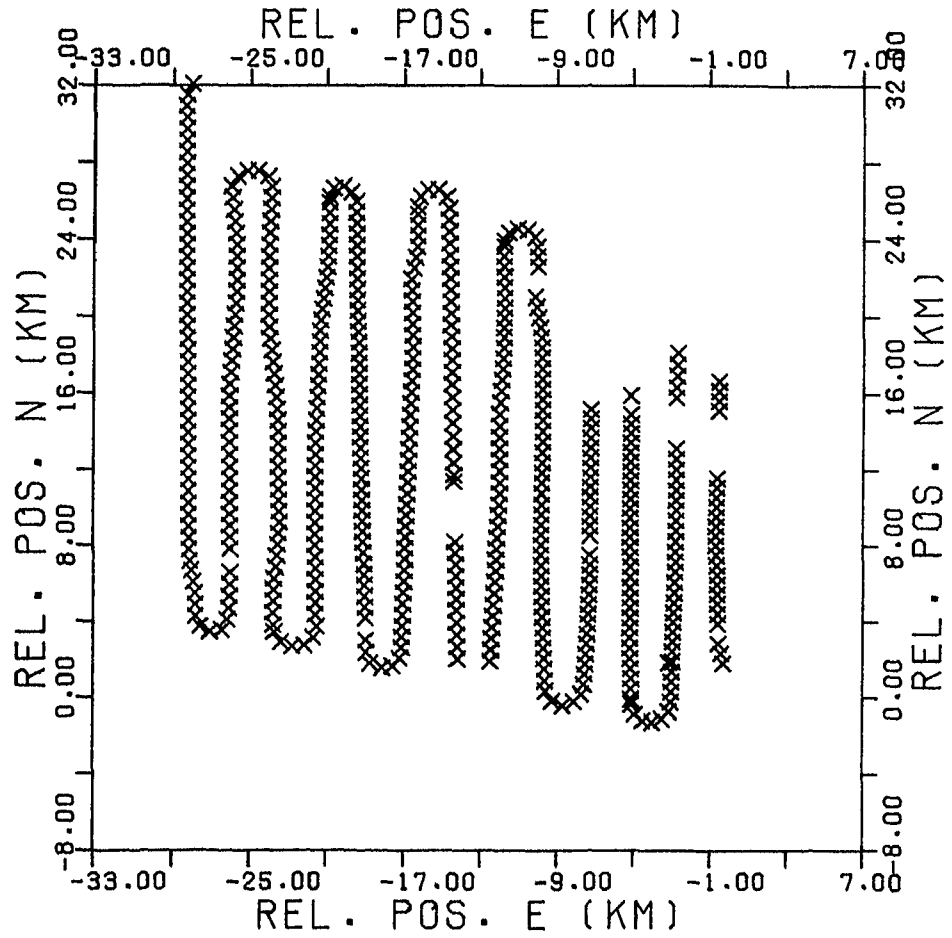
-Salinity on Isobaric Surfaces-



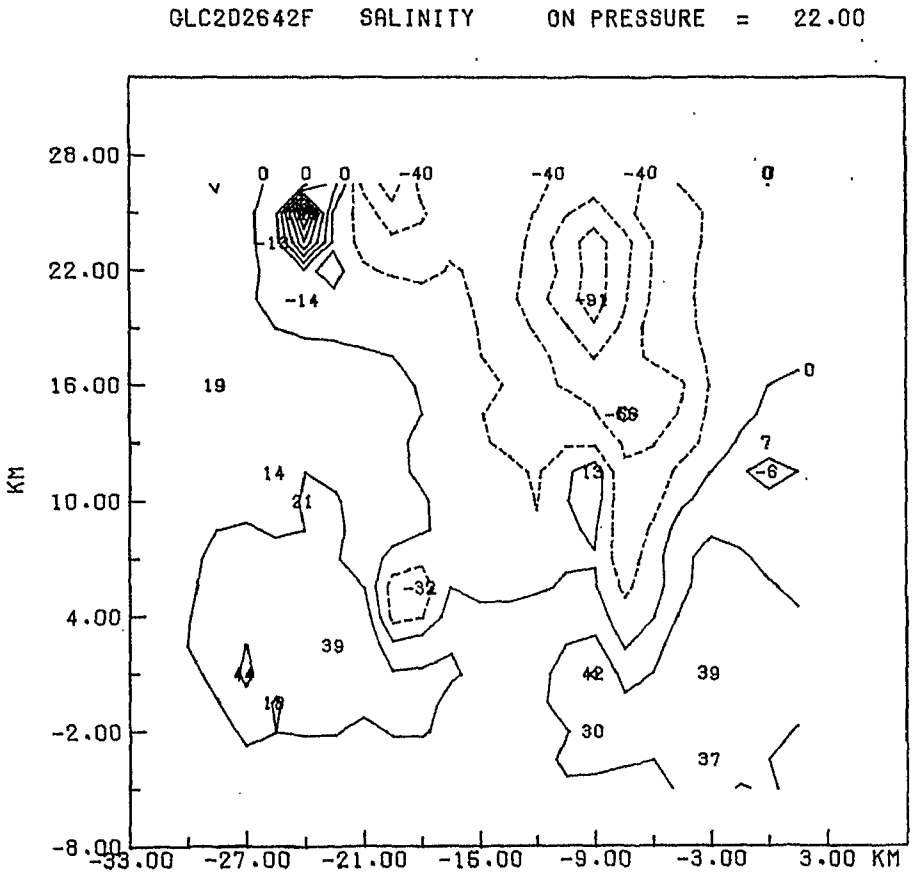


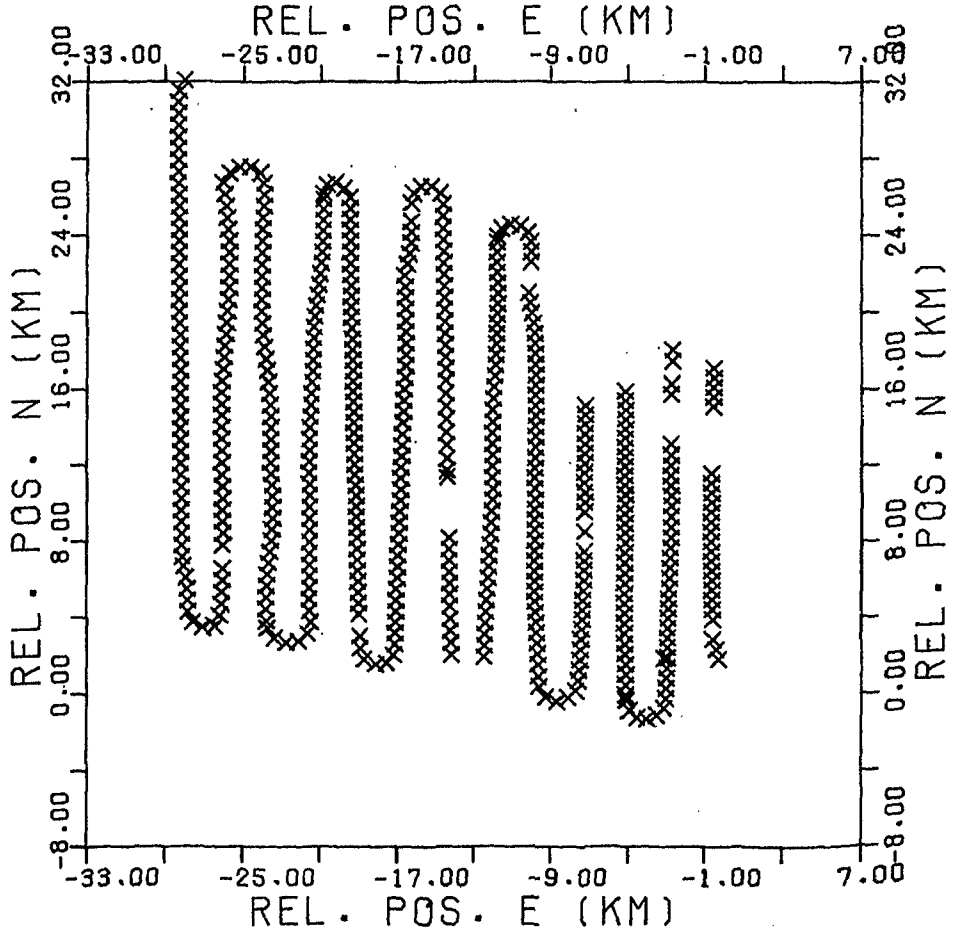
-Salinity on Isobaric Surfaces-



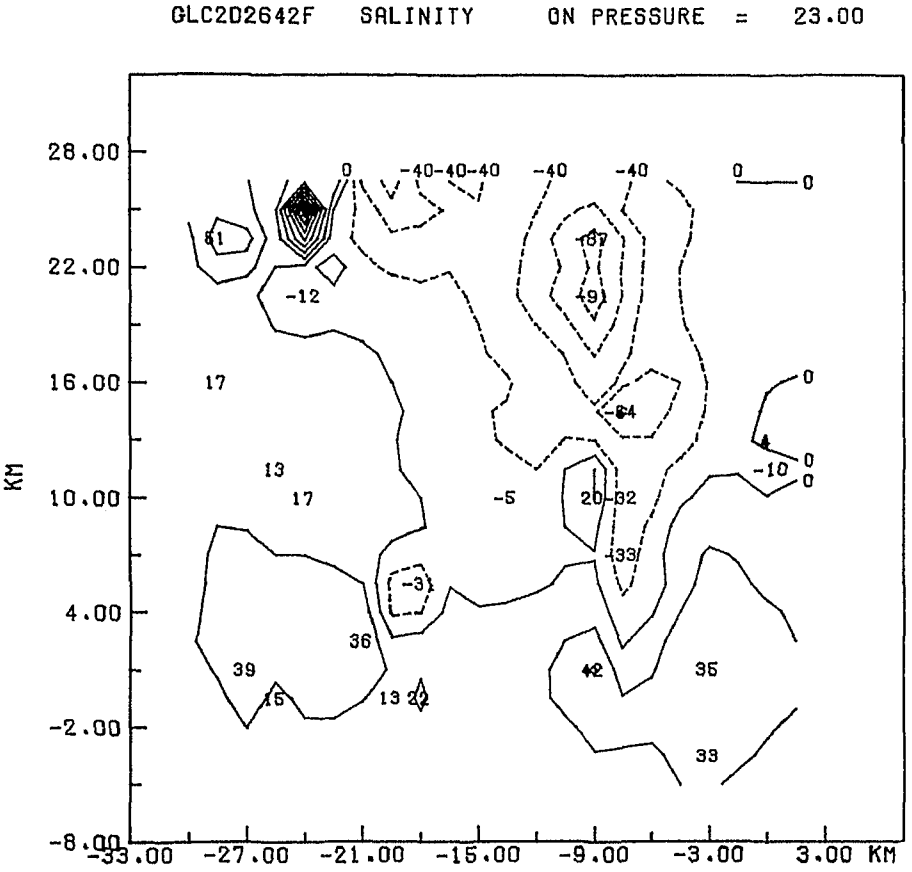


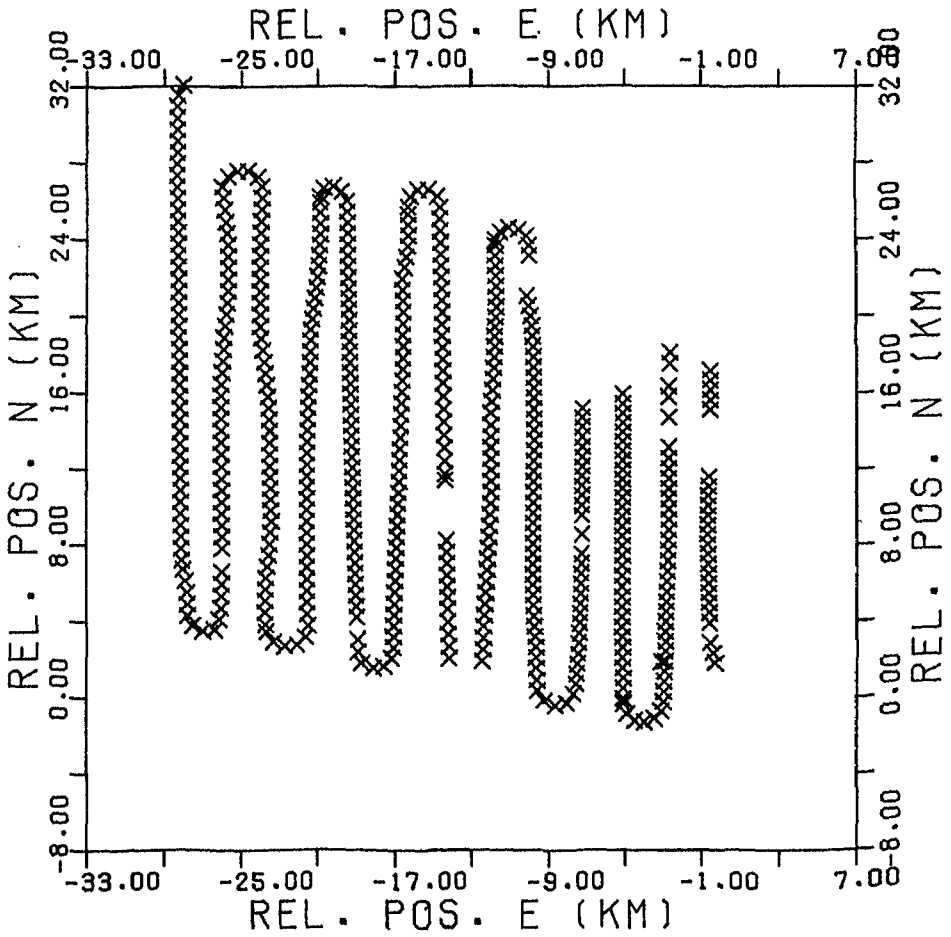
-Salinity on Isobaric Surfaces-



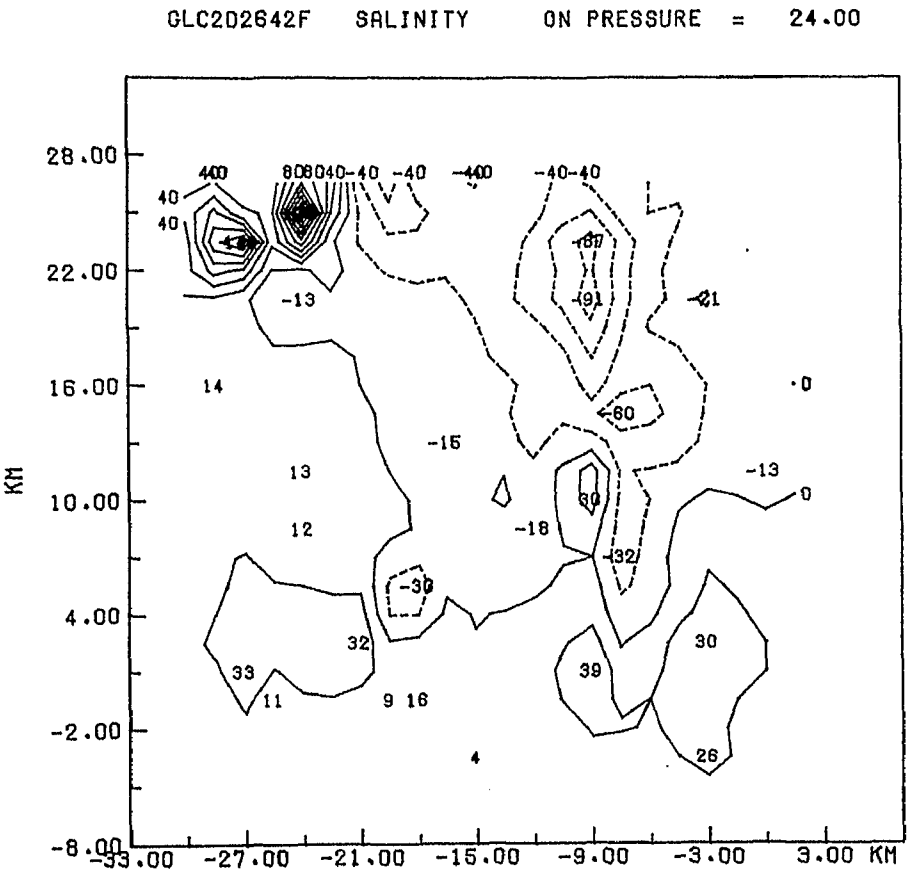


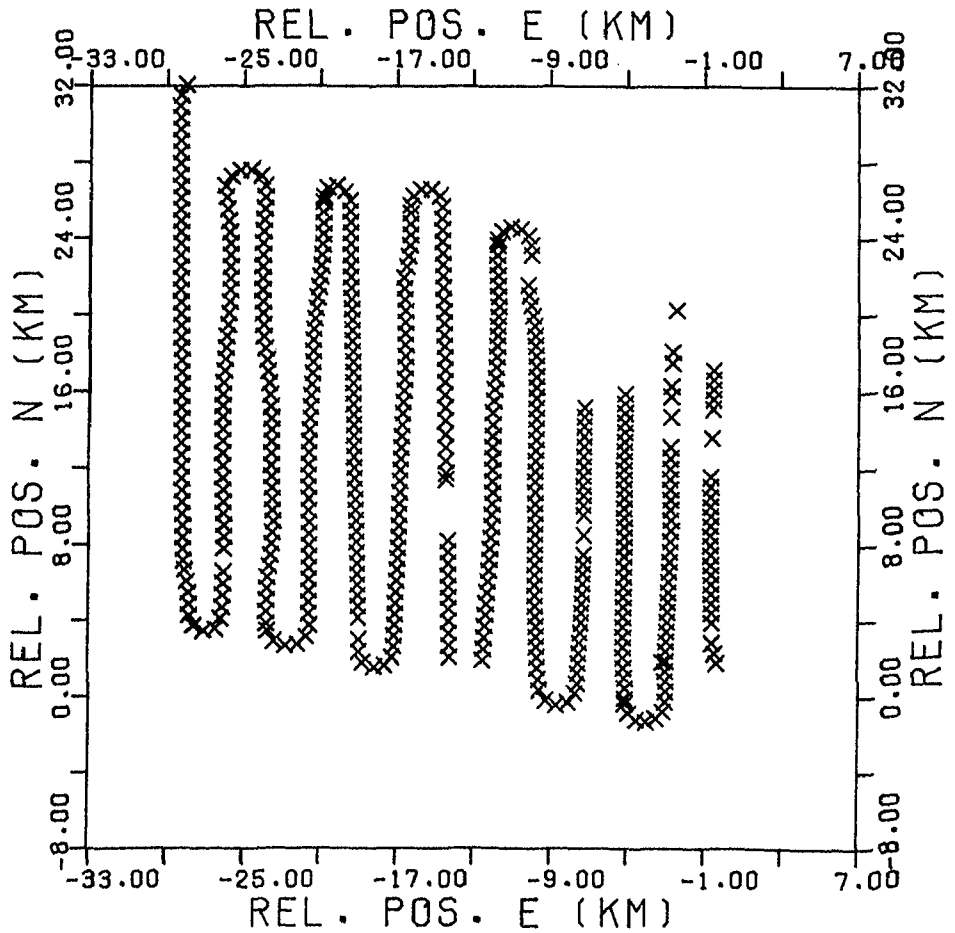
-Salinity on Isobaric Surfaces-





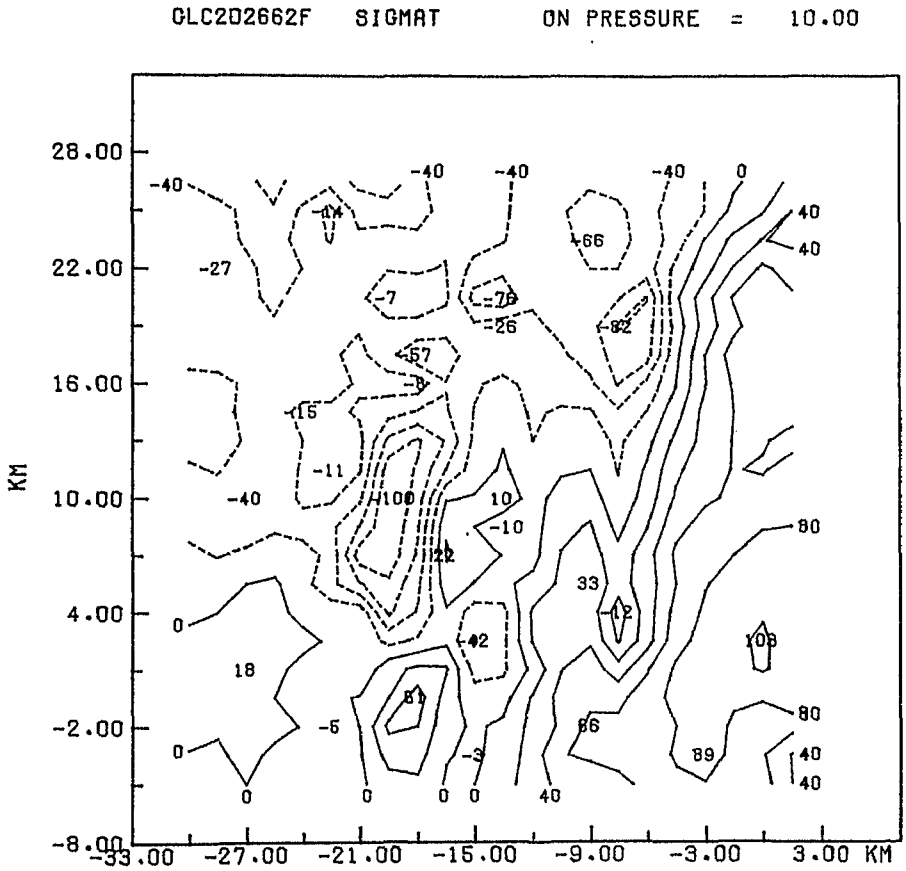
-Salinity on Isobaric Surfaces-

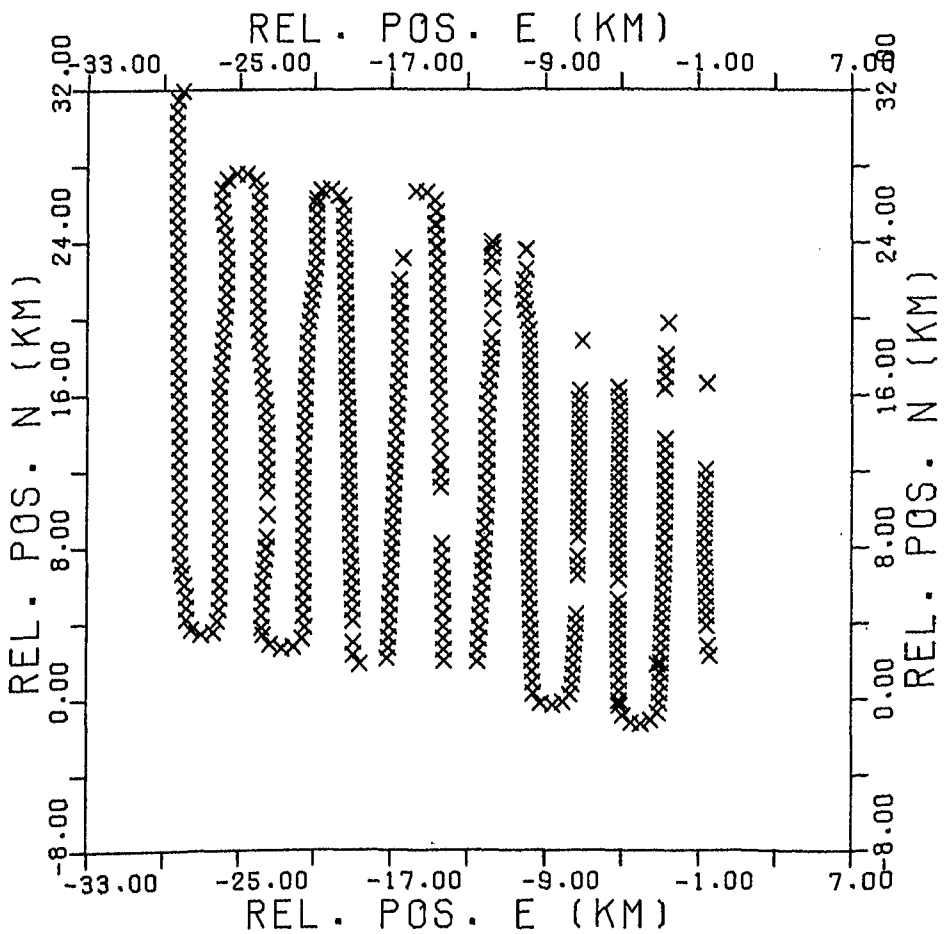




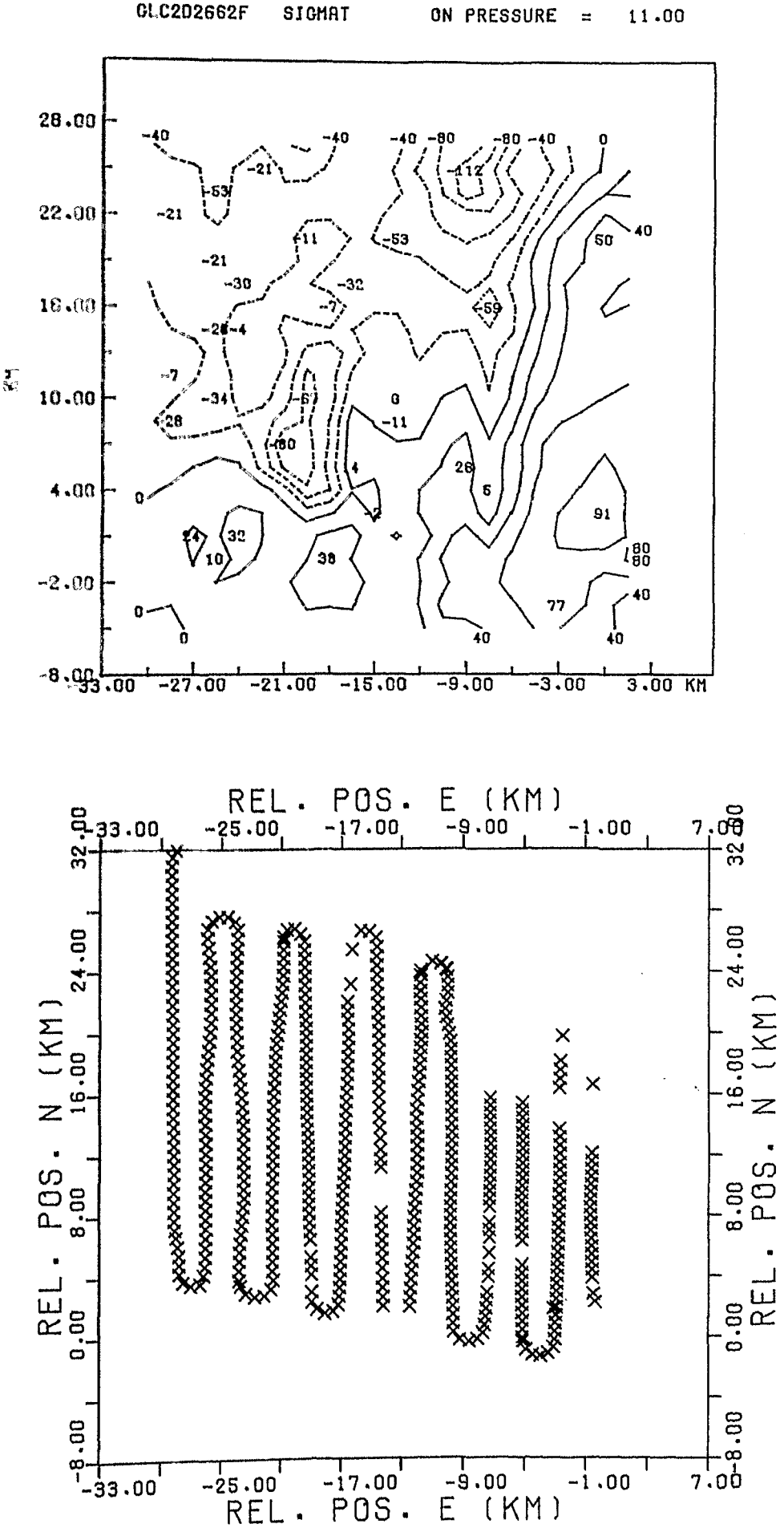
-Salinity on Isobaric Surfaces-

3. Contoured maps of σ_t on surfaces of constant pressure in the range 10 to 24 dbar. The contours are of the density deviation (units in 10^{-3} σ_t) from the mean σ_t value on the surface, which is given in the table at the beginning of this Section. The contour interval is 20 x 10^{-3} σ_t units, the surface interval is 1.0 dbar and the grid spacing in the objective analysis was 1.5 km. The scale of the maps is 1 : 400 000.

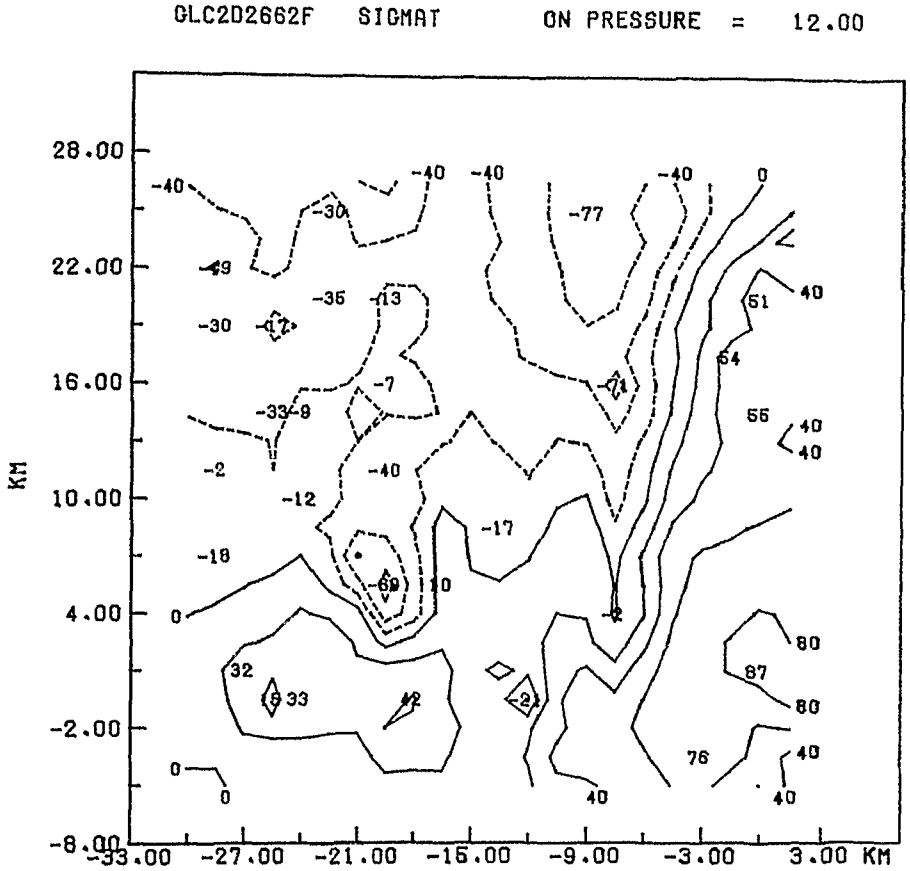


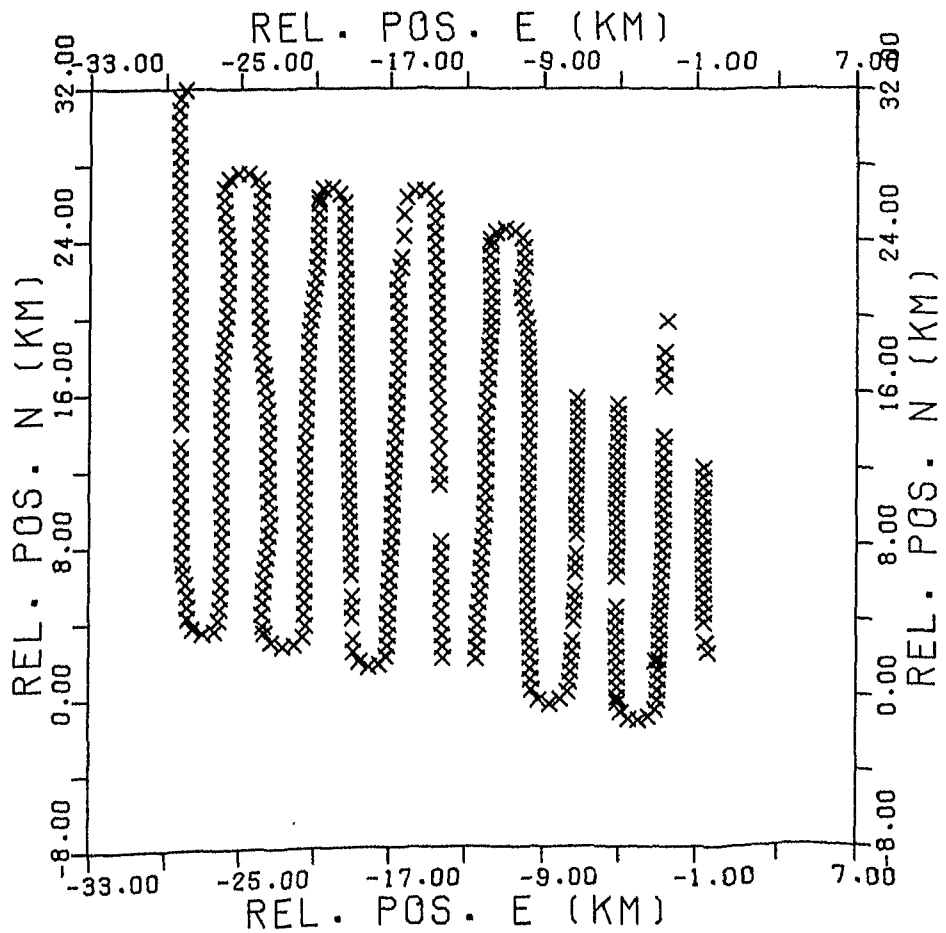


-Density on Isobaric Surfaces-

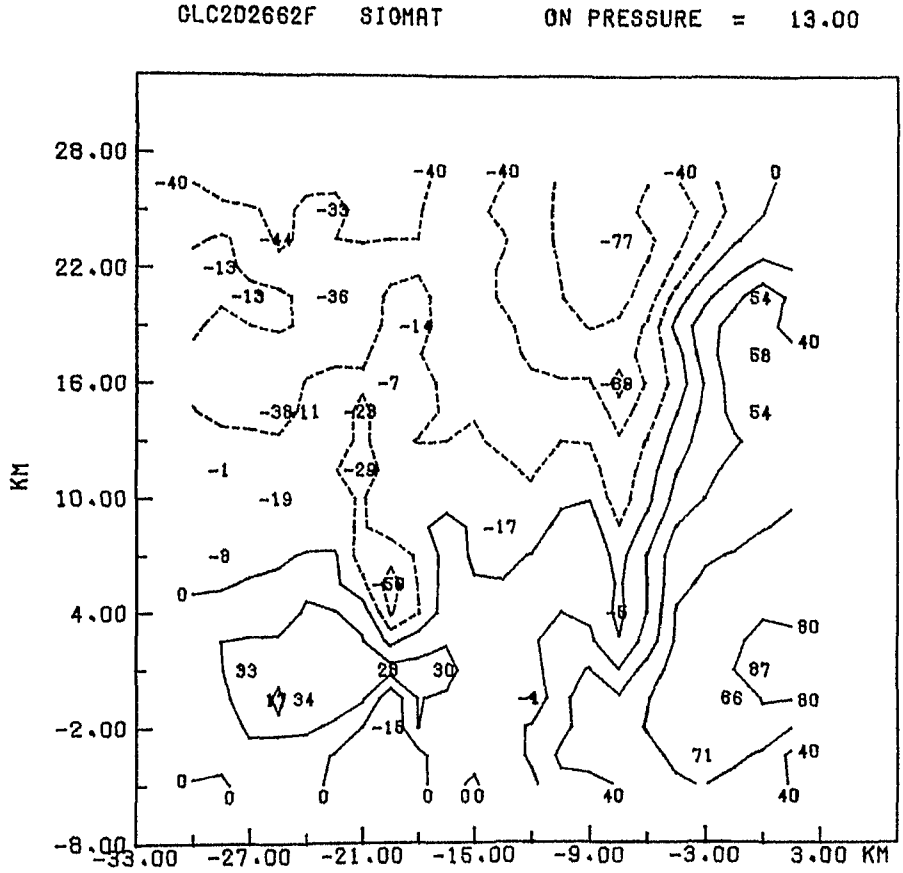


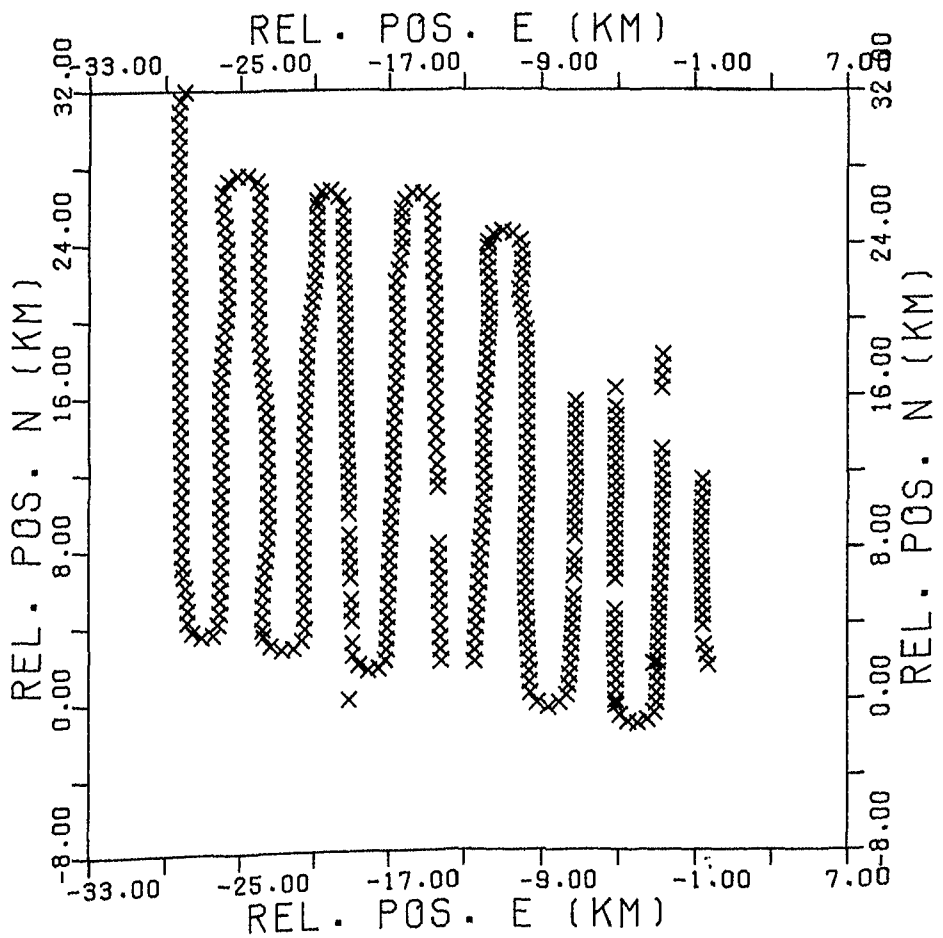
-Density on Isobaric Surfaces-



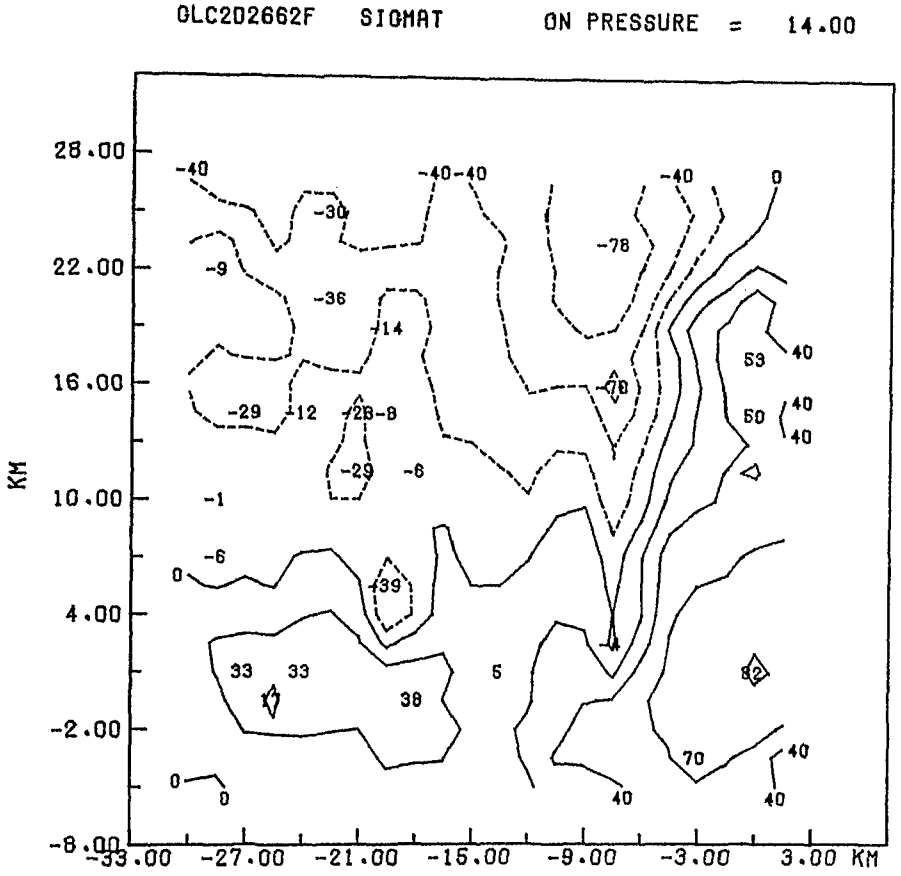


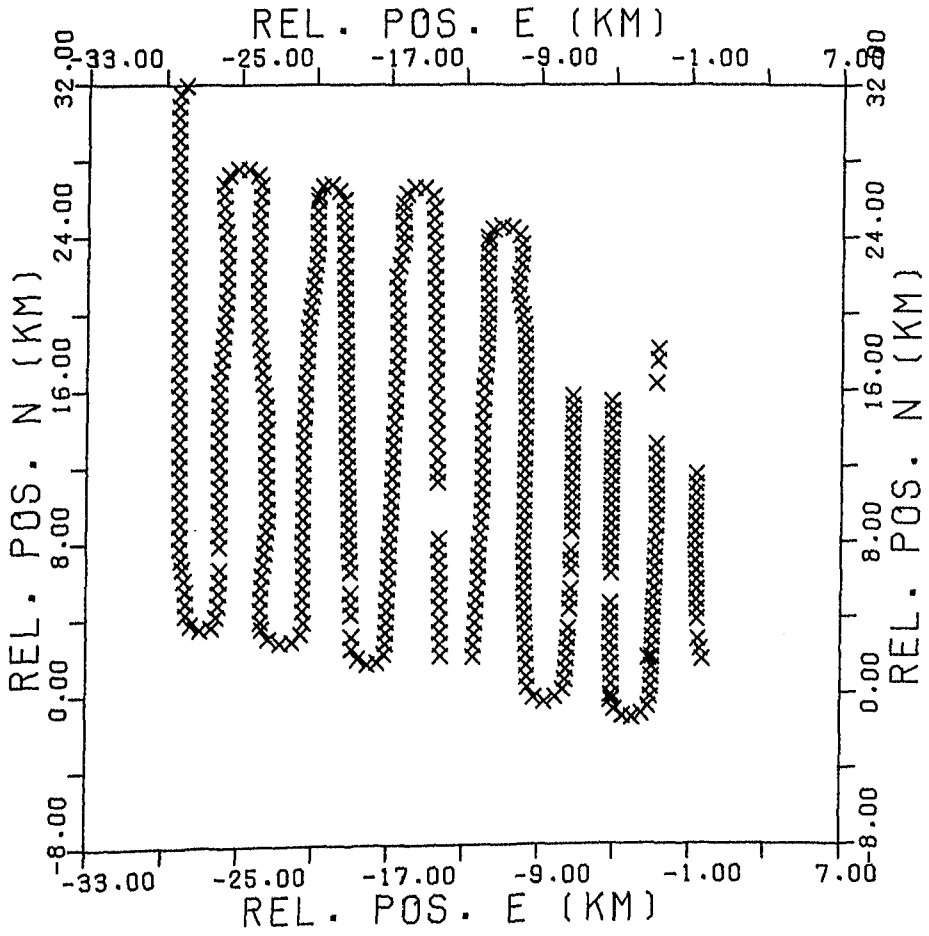
-Density on Isobaric Surfaces-



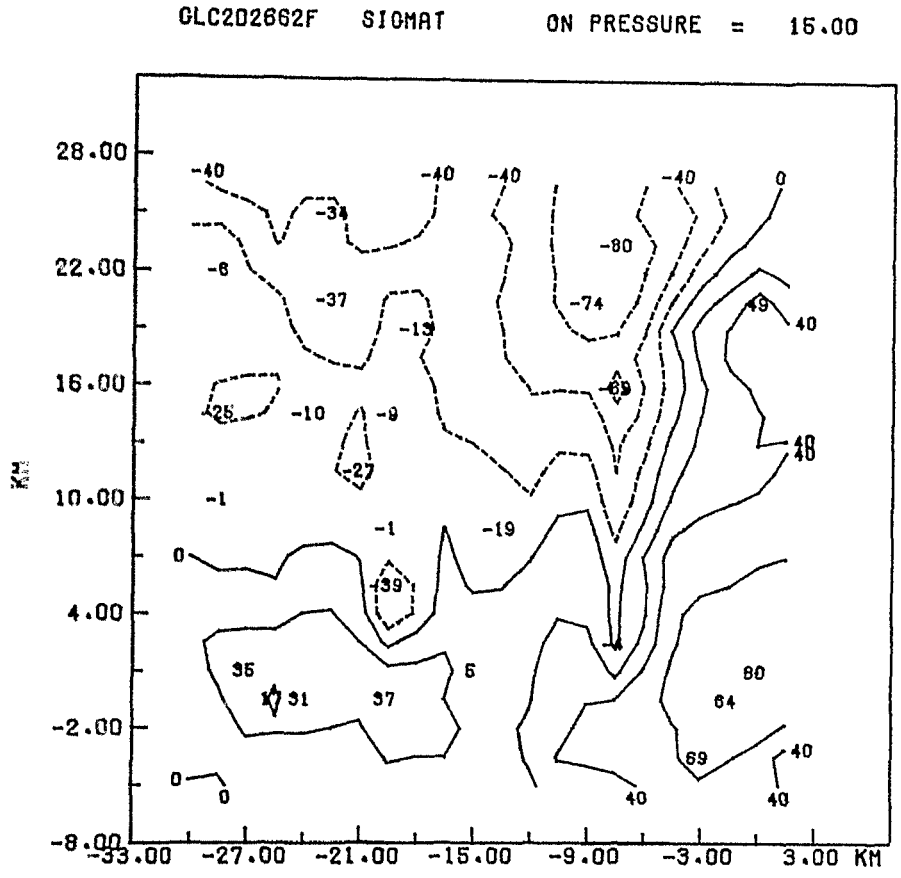


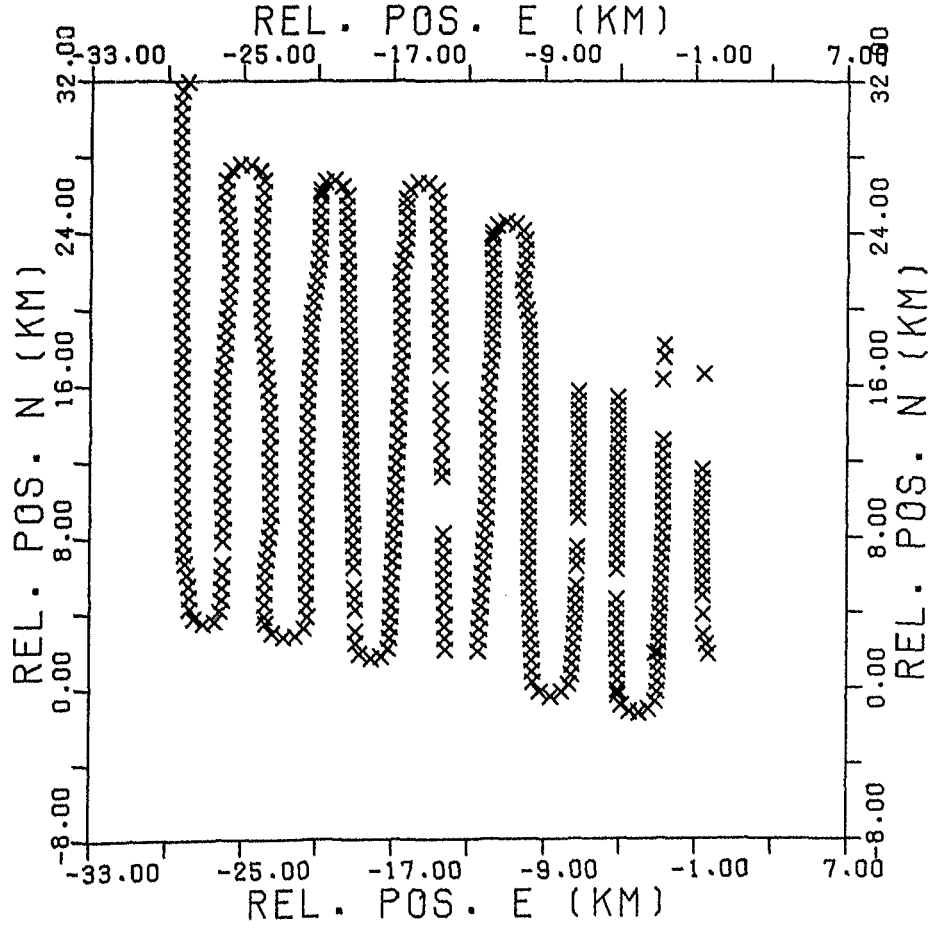
-Density on Isobaric Surfaces-



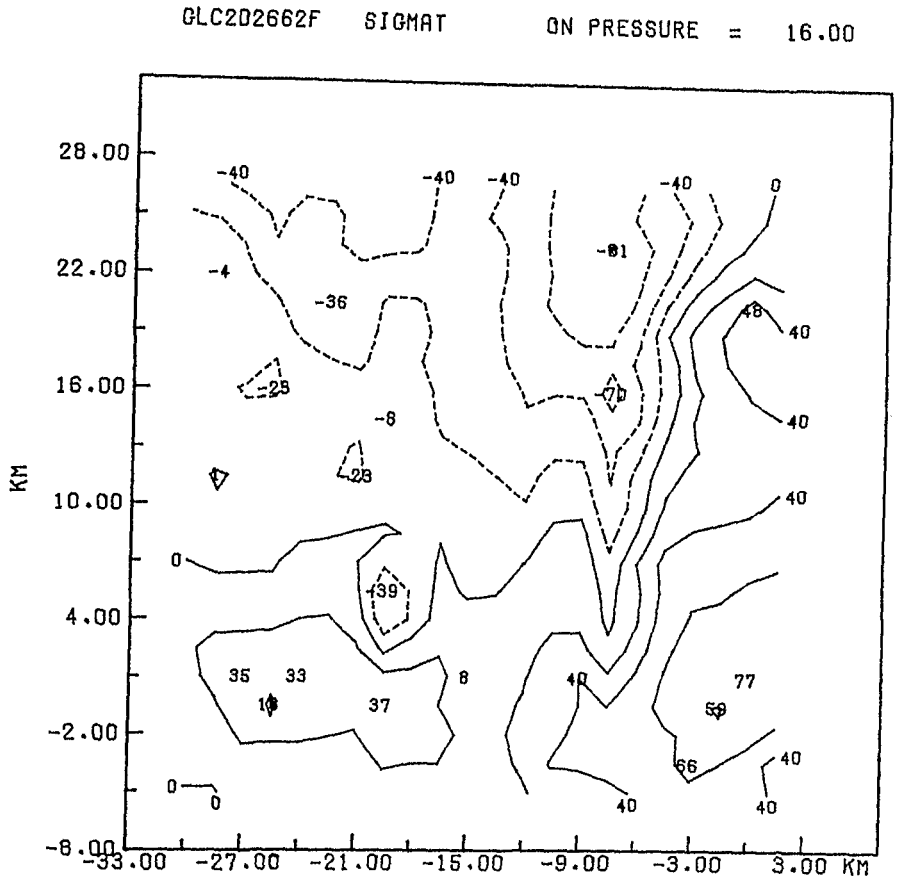


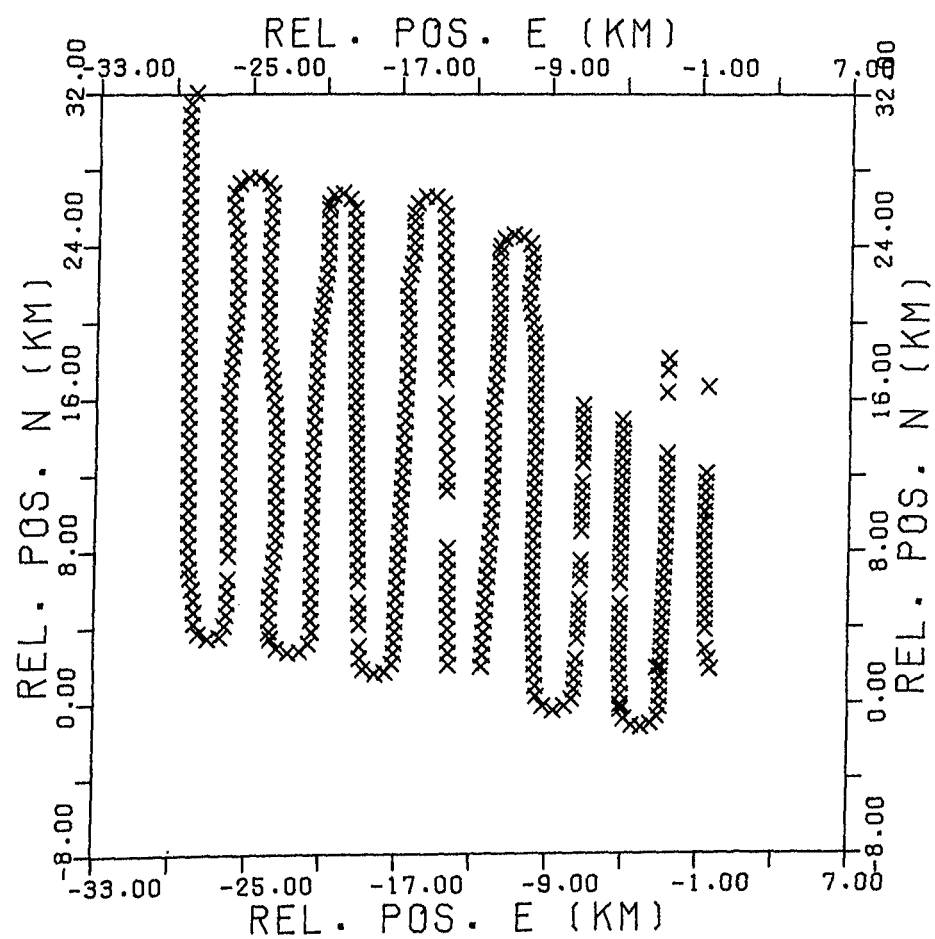
-Density on Isobaric Surfaces-



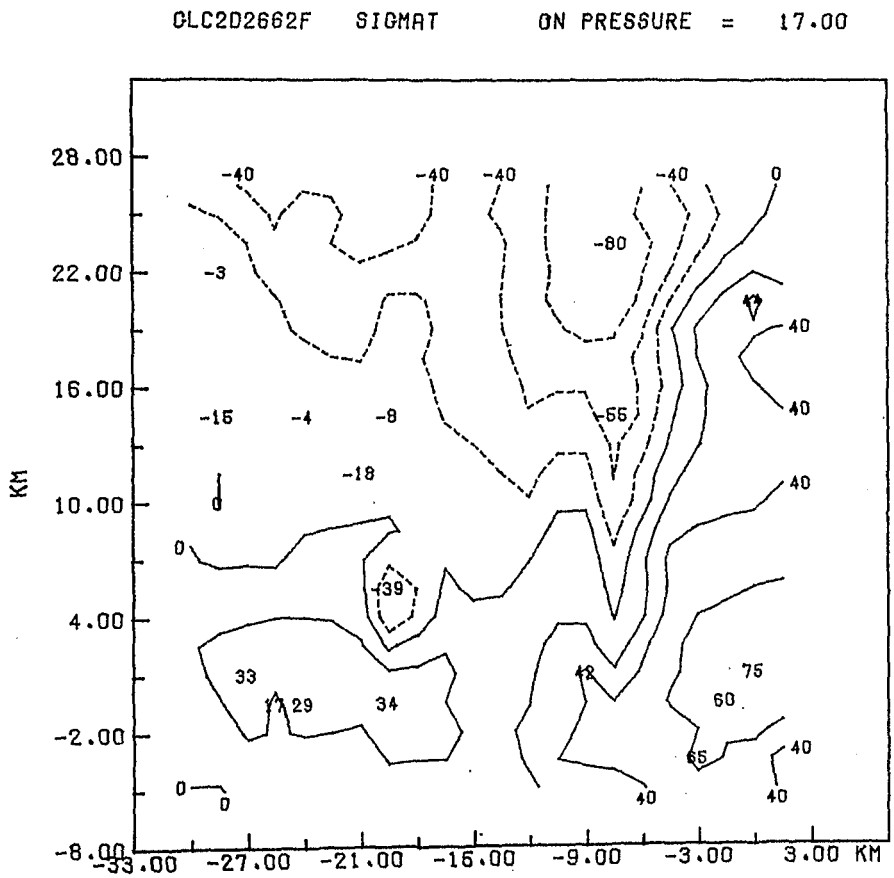


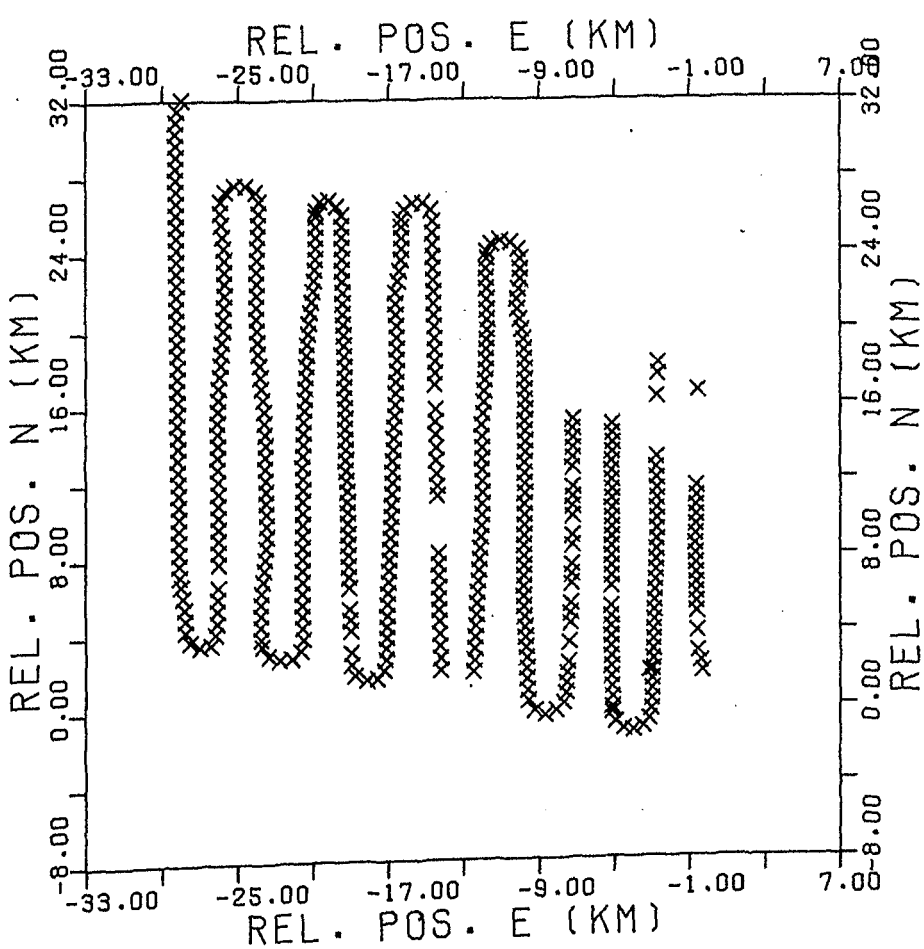
-Density on Isobaric Surfaces-



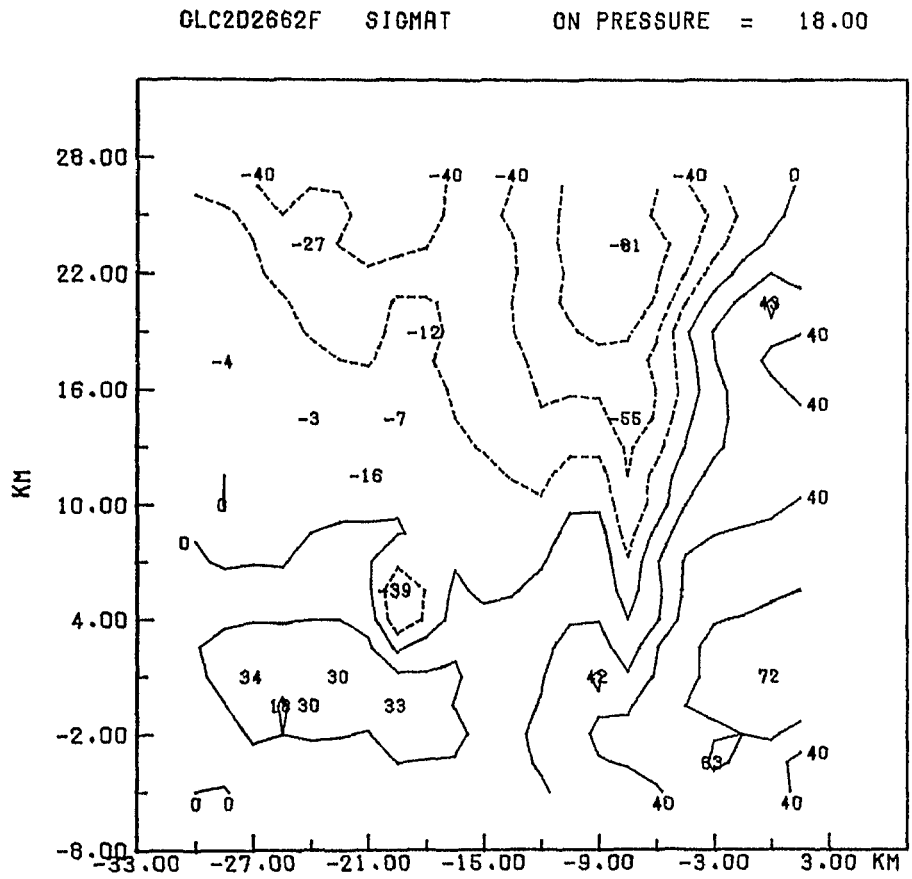


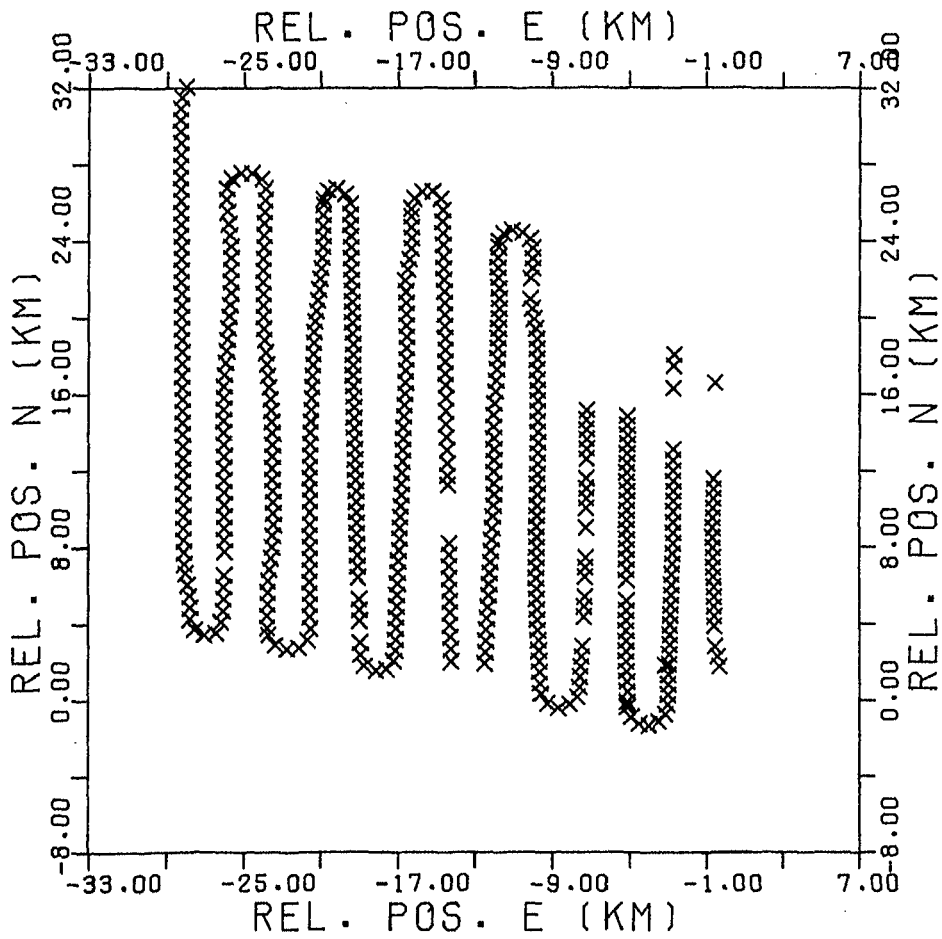
-Density on Isobaric Surfaces-



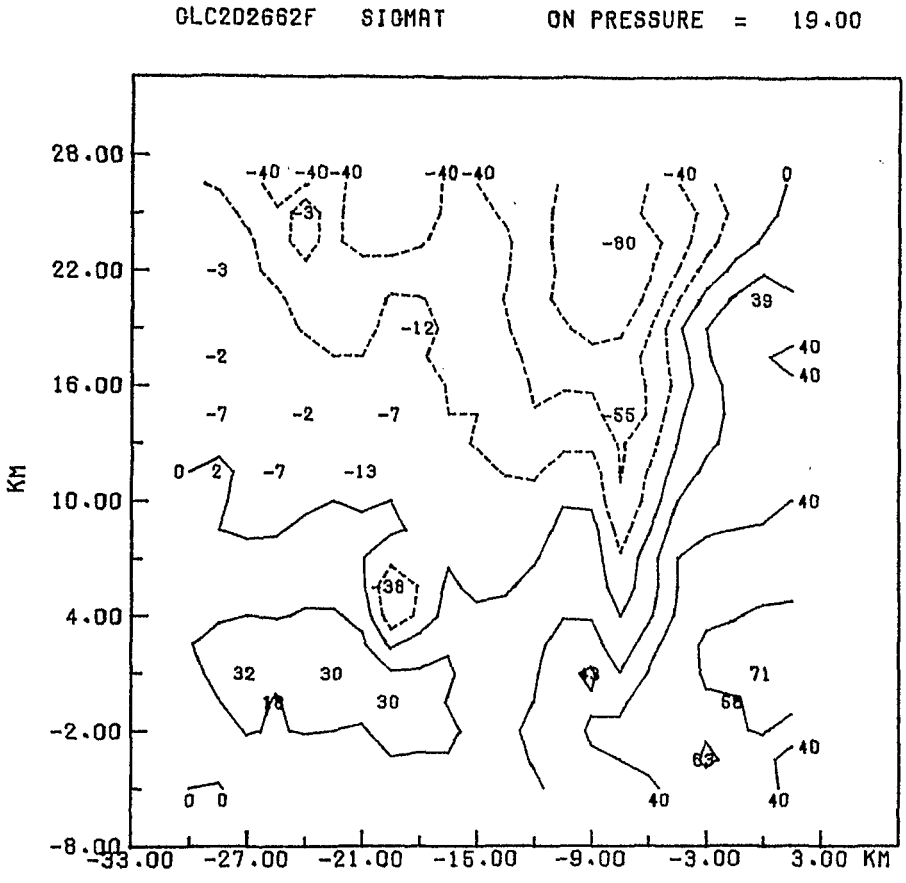


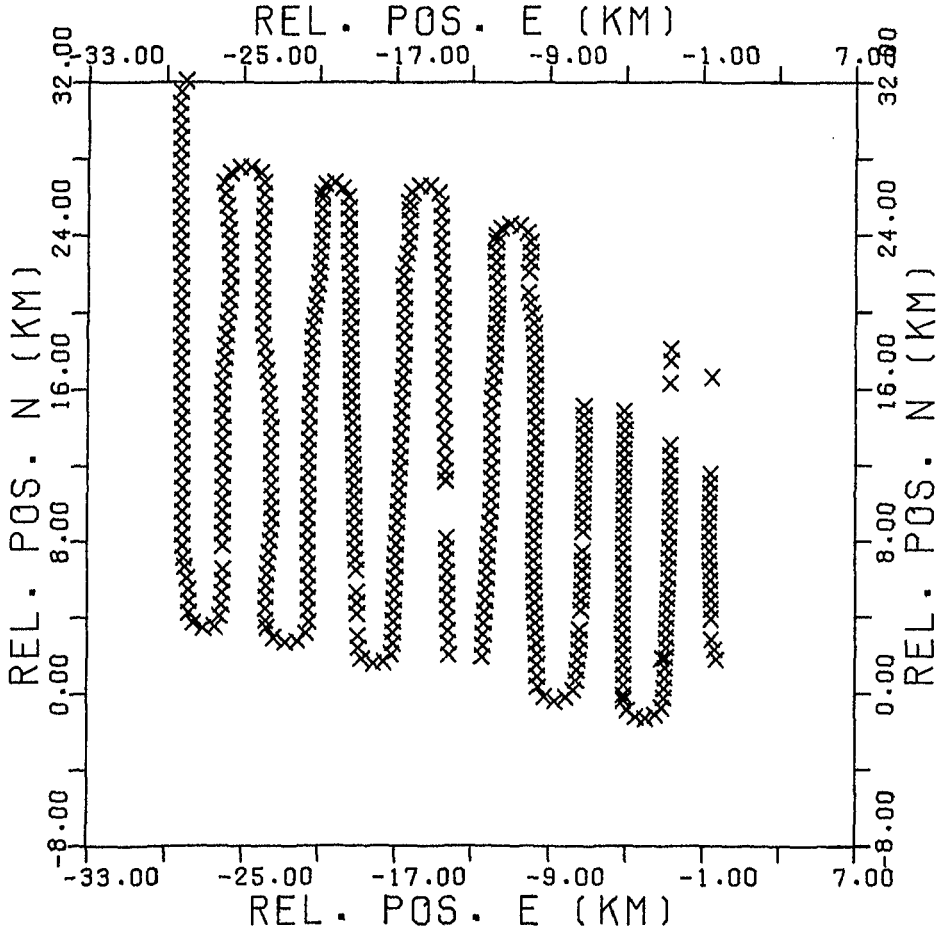
-Density on Isobaric Surfaces-



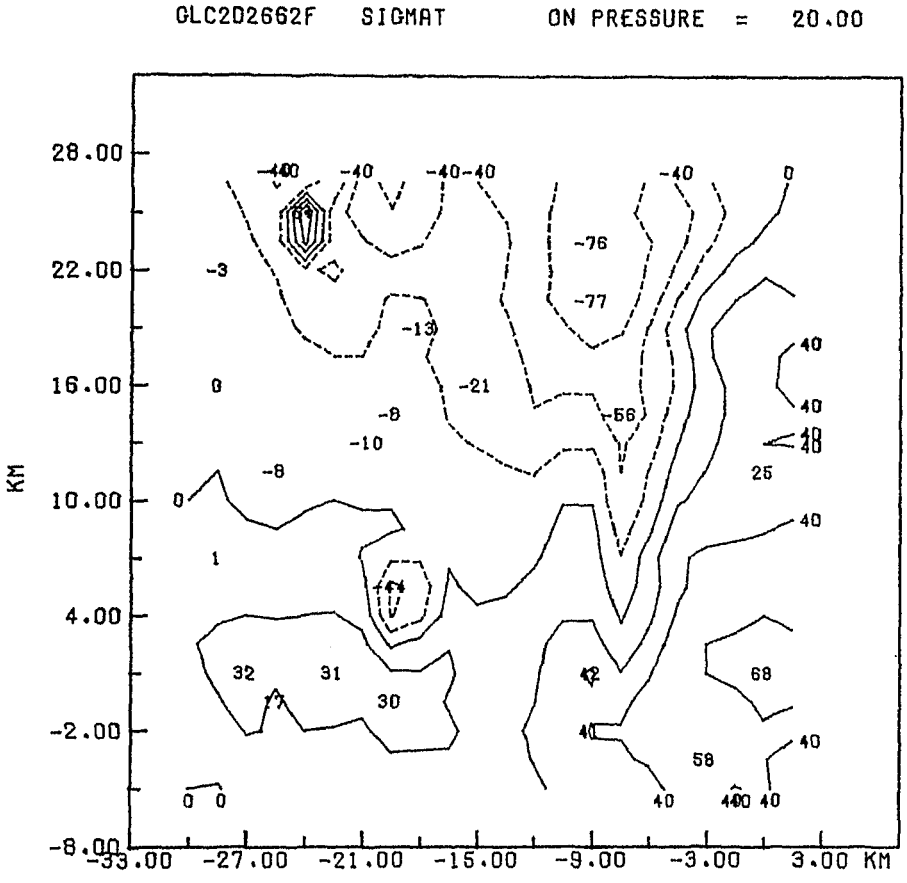


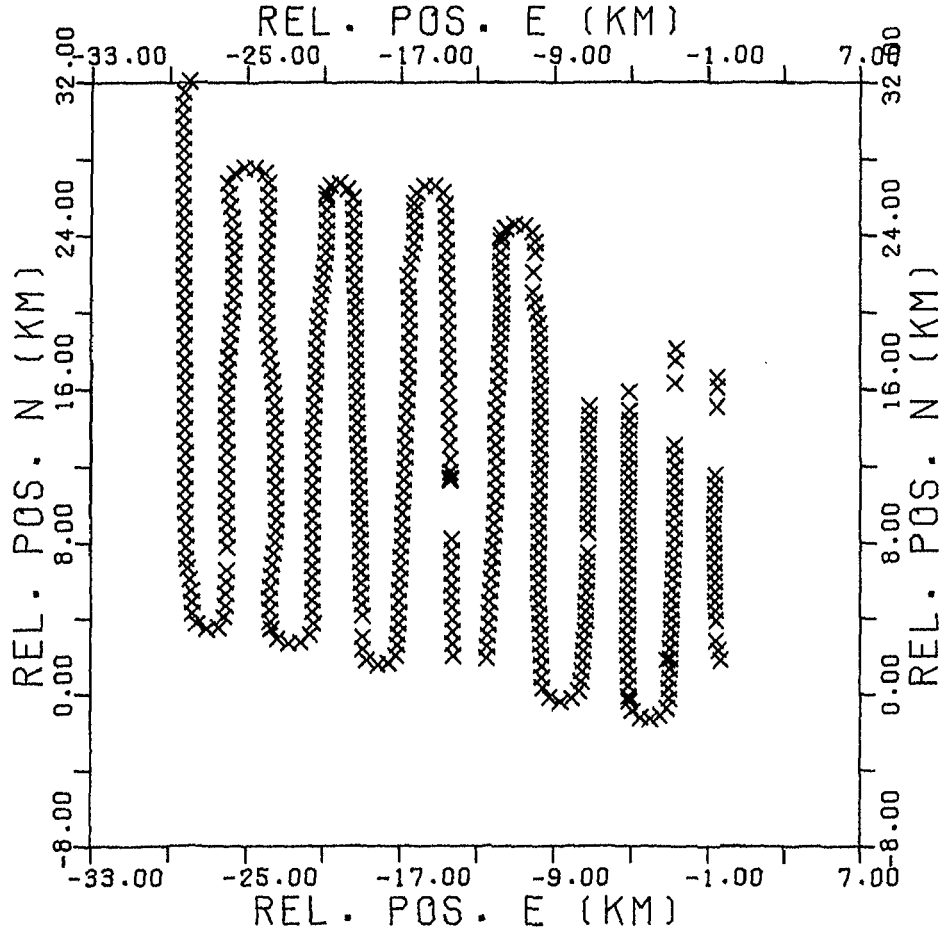
-Density on Isobaric Surfaces-



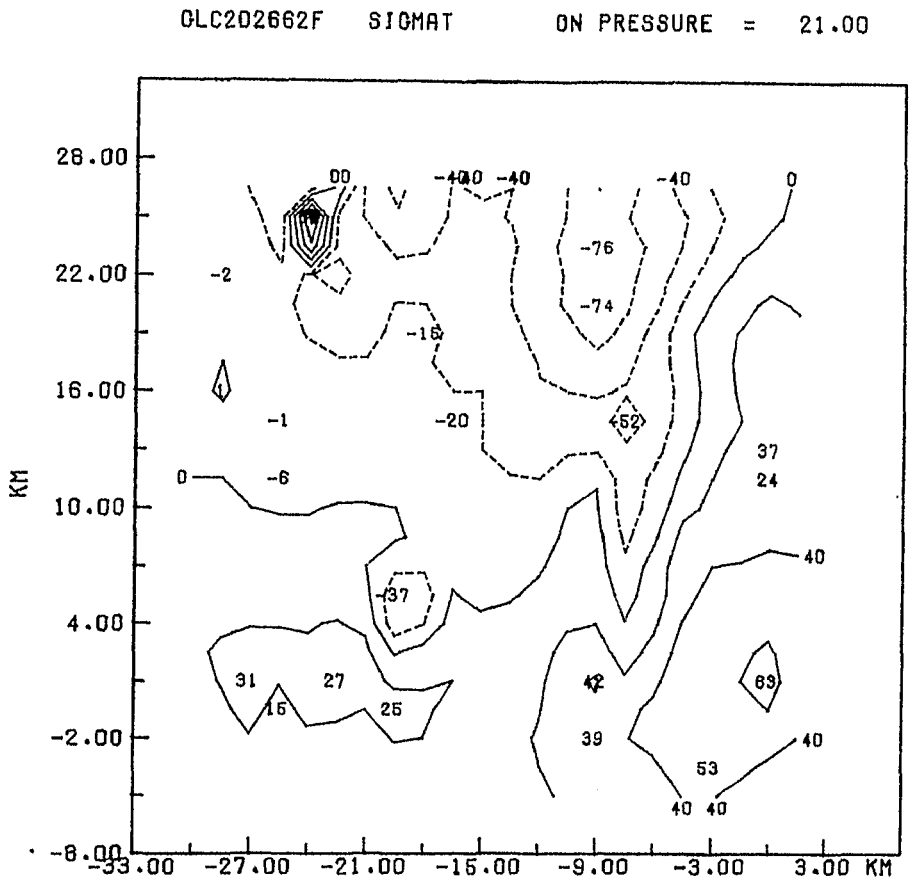


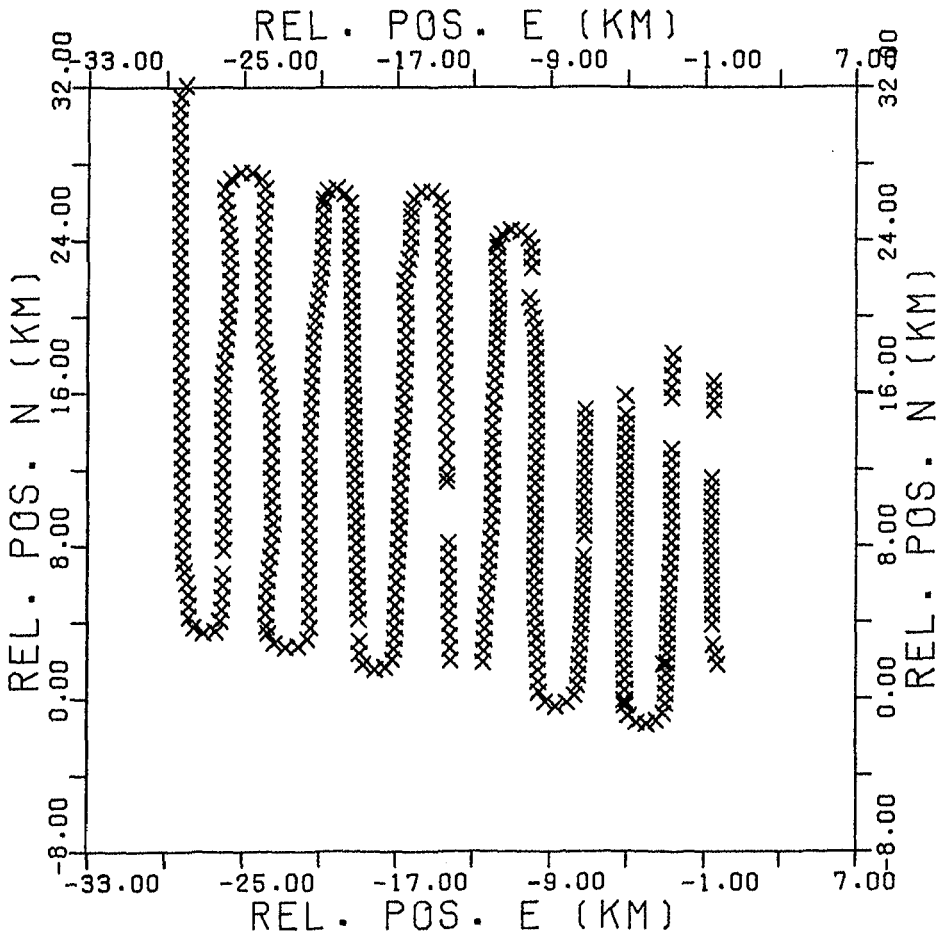
-Density on Isobaric Surfaces-



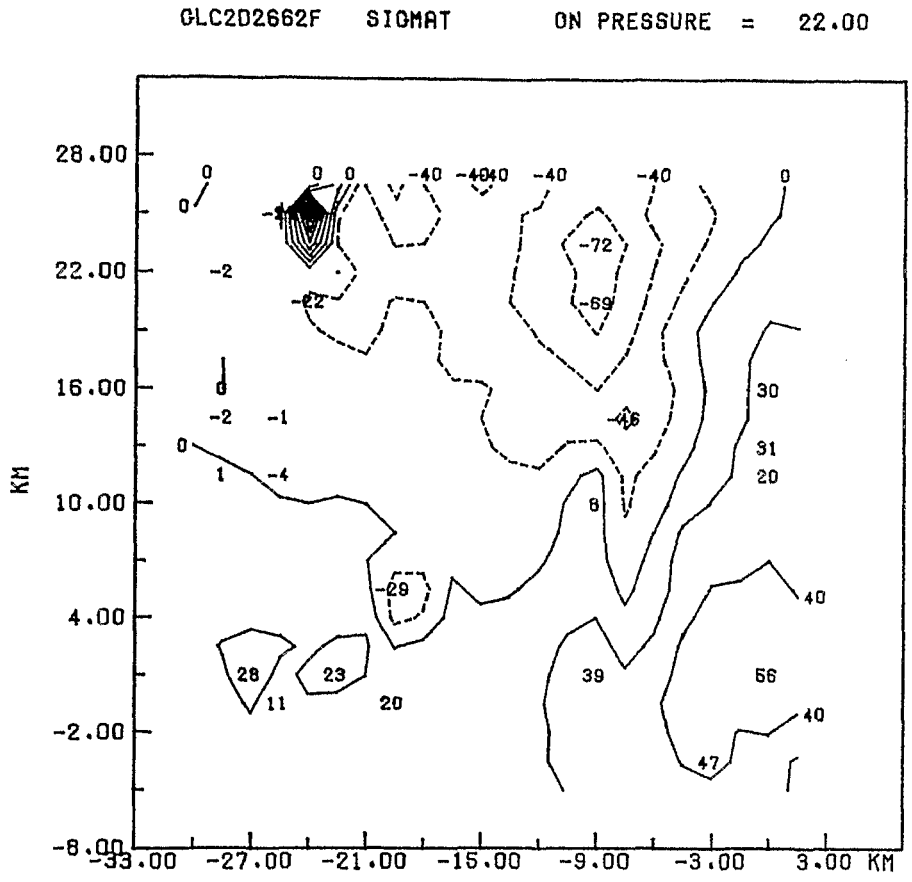


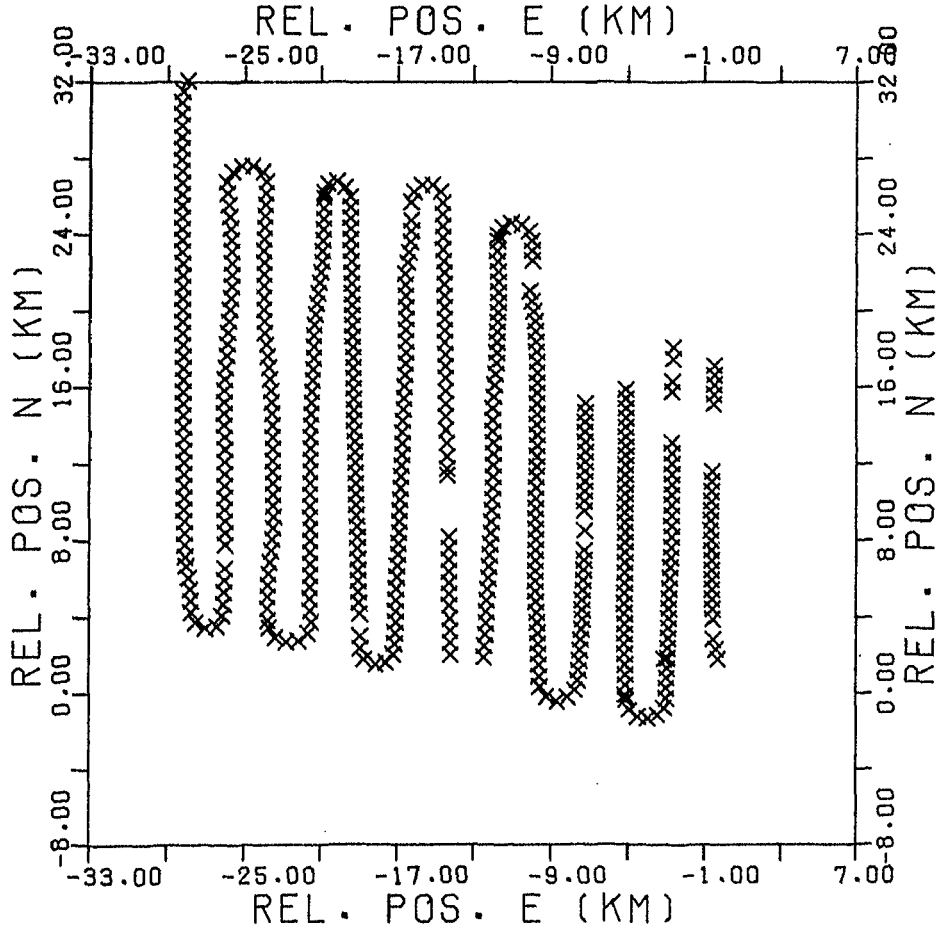
-Density on Isobaric Surfaces-



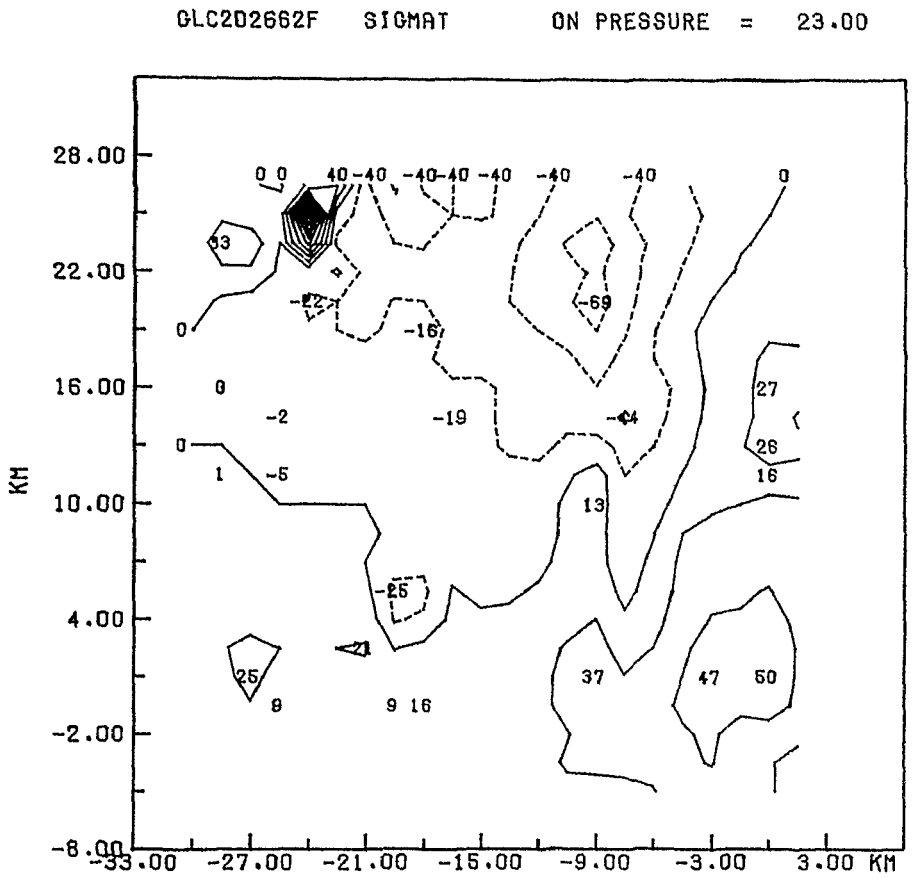


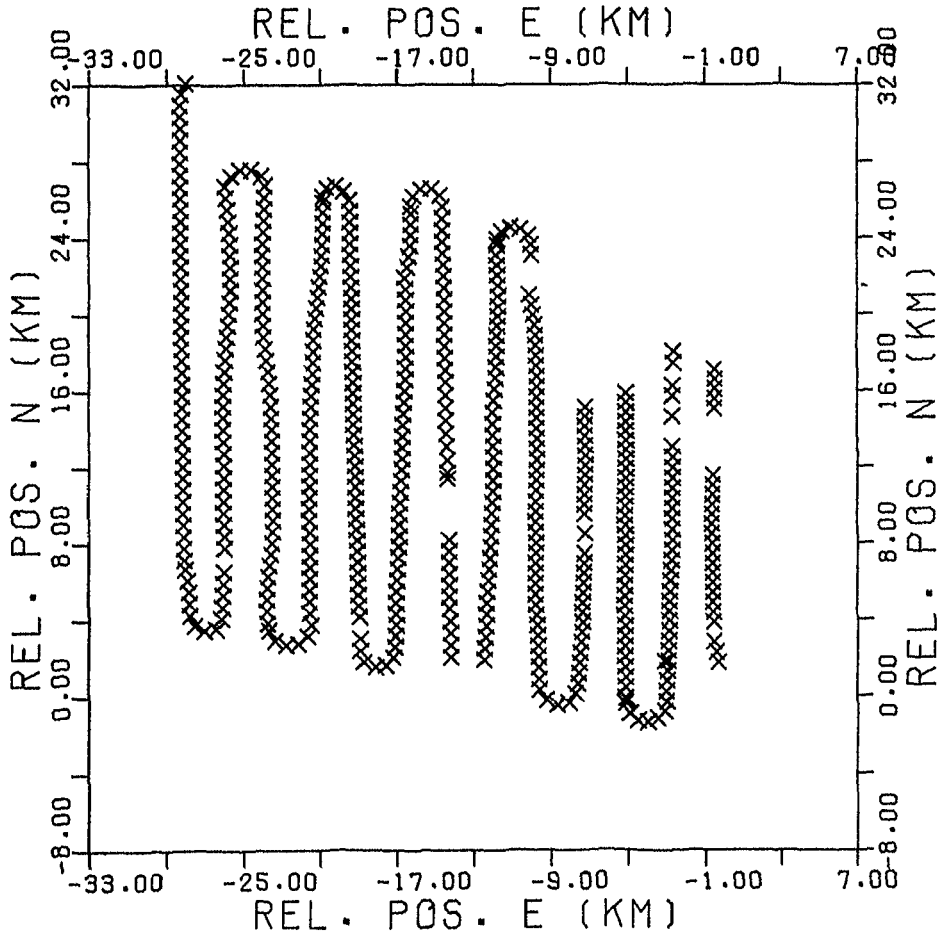
-Density on Isobaric Surfaces-



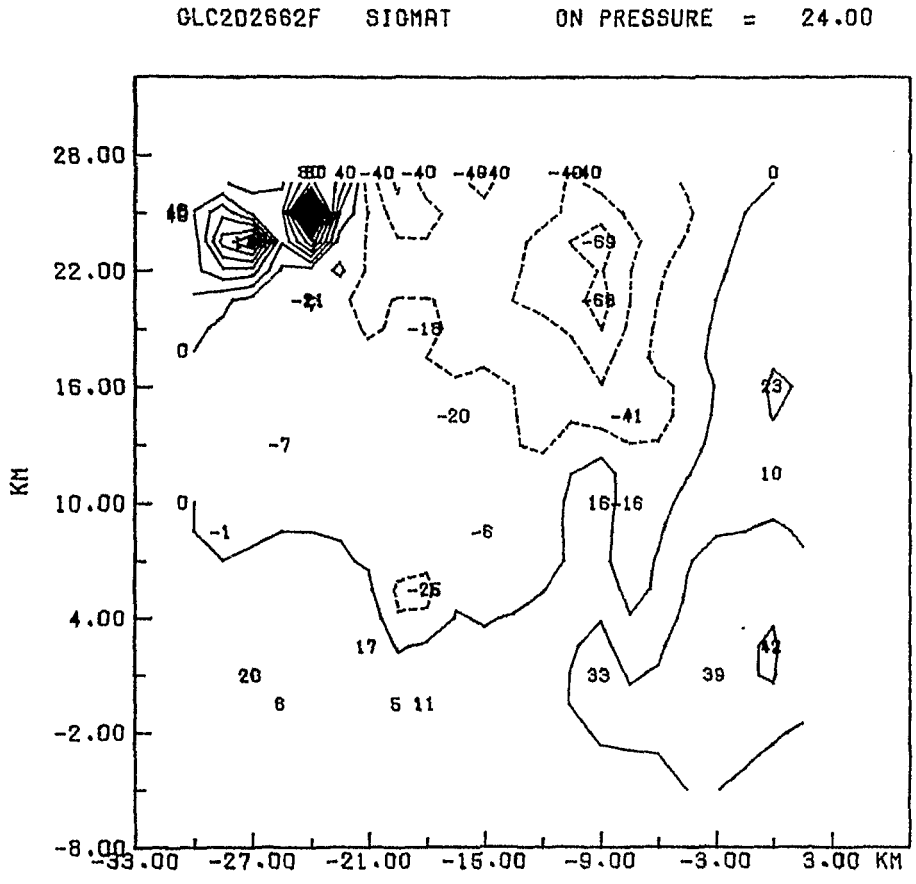


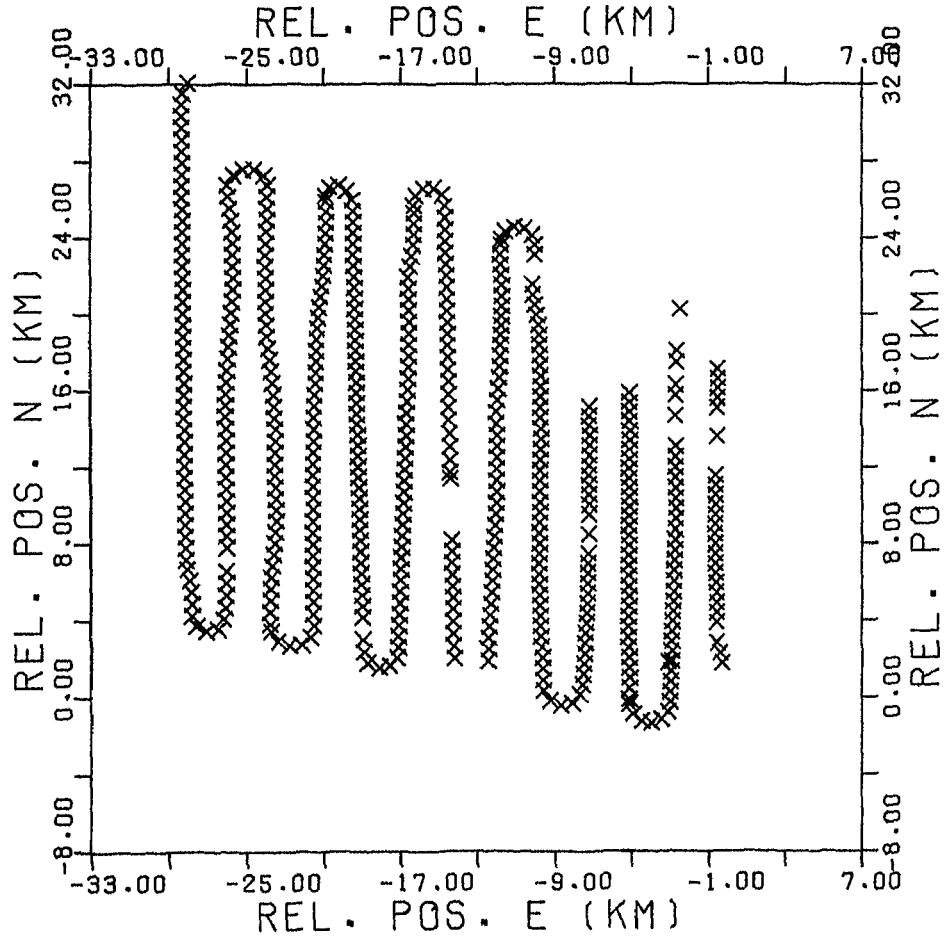
-Density on Isobaric Surfaces-





-Density on Isobaric Surfaces-





-Density on Isobaric Surfaces-